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Adaptive water governance: flood management and the policy process in Scotland

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Josselin Rouillard

2012

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Adaptive water governance:

*Flood management and the policy
process in Scotland*

J. J. Rouillard

Adaptive water governance:
*Flood management and the policy
process in Scotland*

Josselin Jim Rouillard

This thesis is submitted in fulfilment of the requirements for the degree of Doctor
of Philosophy in Geography, School of the Environment, University of Dundee.

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Declaration

The material contained in the thesis has not previously been submitted for a degree in this or any other institution. All references cited have been consulted by the author. The thesis is the sole work of the author, who takes full responsibility for any errors contained.

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Abstract

This thesis improves the understanding of adaptive water governance in the policy process, and draws lessons of policy relevance for flood management. Scholars using the concept of adaptive water governance posit that factors influencing the governing activities of social actors are of critical importance to improve society's capacity to better respond to the on-going water crisis. They developed a set of principles for adaptive water governance, in particular the need for polycentric forms of governance, where power over decision-making is not held by a single social actor but distributed across society, and the use of participatory processes, promoting collective action and enhancing collective reflection. Empirical evidence on the validity of these principles remains sparse, in particular in public policy processes.

The thesis uses established research on the policy process to better conceptualise the governance of complex water problems. It examines empirically the emergence of integrated, ecosystem-based flood management in Scotland, a typical Western democracy though characterised by an interesting history of institutional design and flood policy dynamics. First, factors influencing the formulation and integration of the approach in national environmental policies are identified, drawing on an inductive, thematic and historical analysis of documents and interviews with key policy actors. Second, factors influencing the implementation of the approach, in particular the role of policy instruments and public participation, are then identified in the Eddleston and Bowmont-Glen catchments. A combination of documentary analysis, interviews with local actors, and Q Methodology are used.

The thesis supports the general principle that polycentric governance can improve the adaptability of governance systems. Horizontally, multiple actors with decision-making power may encourage greater reflexivity in the policy process. Having multiple policy regimes may also foster innovative interventions. Vertically, significant autonomy between governance levels may help better adapt

policies to the appropriate scale of intervention. The devolution of legislative powers from the British to the Scottish level is presented as an example. At a more local level, providing greater autonomy to implementers can enhance their capacity to enforce policies. The thesis also provides evidence for critics of polycentric governance. In particular, polycentric governance may result in a lack of coherence between policy regimes, heterogeneous implementation, and potentially status-quo, rather than change. The thesis supports the idea that a strong participatory approach may help overcome the limitations of polycentric governance. Findings indicate that critical factors for success are the institutional context in which it occurs, its inclusive nature, adequate resourcing, time available, and the willingness of participants to reach compromise and learn. Individual entrepreneurship is clearly fundamental to increase the adaptability of governance systems.

Overall, the thesis shows that attention to the public policy process is an important analytical approach to the study of adaptive governance. Past research on the policy process provides constructive theories to explore principles of adaptive governance in an empirical context. Main policy recommendations, for Scotland and beyond, include, amongst others, a call for strong governance arrangements to accompany the work of multi-actor groups for policy integration, the use of instrument mixes across policy regimes to influence land managers, and greater support for non-governmental catchment organisations to foster local collaboration and improve policy implementation.

Abbreviations

1958 Act	Land Drainage (Scotland) Act 1958
1961 Act	Flood Prevention (Scotland) Act 1961
1997 Act	Flood Prevention and Land Drainage (Scotland) Act 1997
2009 Act	Flood Risk Management (Scotland) Act 2009
CAP	Common Agricultural Policy
CAR	Controlled Activities Regulation
CoSLA	Convention of Scottish Local Authorities
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
FC	Forestry Commission
FC-Scotland	Forestry Commission Scotland
FIAC	Flooding Issues Advisory Committee
FLAG	Flood Local Action Group
FPS	Flood Prevention Schemes (until 2009); Flood Protection Schemes (post 2009)
FRAG	Flood Risk Advisory Group
FRMP	Flood Risk Management Plan
GAEC	Good Agricultural and Environmental Condition
HLS	Higher Level Stewardship
IWRM	Integrated Water Resource Management
LFASS	Less Favoured Area Support Scheme
LMO	Land Mangers Option grant scheme
MSP	Members of the Scottish Parliament
NE	Natural England
NFF	National Flood Framework
NGOs	Non Governmental Organisations
NTAG	National Technical Advisory Group
RAEC	Rural Affairs and Environment Committee
RBMP	River Basin Management Plan
RDPE	Rural Development Programme for England
RP	Rural Priority grant scheme
RPAC	Regional Proposal Assessment Committee for Rural
Priorities	
RPID	Rural Payments and Inspectorate Department
SAC	Special Areas of Conservation
SBC	Scottish Borders Council
SEARS	Scotland's Environment and Rural Services

SEPA	Scottish Environment Protection Agency
SFM	Sustainable Flood Management
SFP	Single Farm Payment
SMR	Statutory Management Requirement
SNH	Scottish Natural Heritage
SRDP	Scottish Rural Development Programme
SSSI	Site of Special Scientific Interest
WERF	Water Environment Restoration Fund

Chapter 1 General Introduction

The sustainable management of water resources is of fundamental importance for society, but remains an extraordinary challenge across the world. A staggering 2.4 billion people still lacked adequate sanitation in 2006, and, by 2030, an estimated 47% of the total world population will live in areas of high water stress (WWAP, 2009). Hydrological disasters are the most frequent natural hazards across the world, affecting annually an average of 39 million people (Vos *et al.*, 2010). In Europe¹ alone, 213 flood events² were reported between 1998 and 2009, with a total number of fatalities of more than 1,100 and a cost of €60 billion (2009 values) (EEA, 2010). Population growth and economic development are increasing the pressure on water ecosystems. Intensive water use may deplete water resources, and changes in land use through deforestation, agricultural production or urbanisation can profoundly modify hydrological dynamics, resulting in the loss of important habitats and the services they offer to society (Aylward *et al.*, 2005). Climate change is expected to exacerbate water hazards (Parry *et al.*, 2007), and this, together with on-going urbanisation of low-lying areas, means society may become more exposed to flooding.

There is a growing interest internationally in making society less vulnerable to water stress and hazards (WMO, 2009; WWAP, 2009; OECD, 2011). In parallel, water management is seen as having a major role in increasing the capacity of society to respond and adapt to future environmental and social stress. For example, the EU White Paper on Adapting to Climate Change aims to “*promote strategies which increase the resilience to climate change of health, property and the productive functions of land, inter alia by improving the management of water resources and ecosystems*” (European Commission, 2009, p. 5). Of late, the concept of Integrated Water Resources Management (IWRM) has become popular

¹ Defined as the 27 EU Member States, Iceland, Liechtenstein, Norway, Switzerland and Turkey.

² As reported to the EM-DAT database maintained by the WHO Collaborating Centre for Research on the Epidemiology of Disasters, which include events where 1) 10 people or more were killed, and/or 2) 100 people or more were affected, and/or 3) declaration of state of emergency, and/or 4) there is a call for international assistance.

as a way to encourage an ecosystem approach to water management, and mainstream the consideration of water issues in governmental and societal decisions. While IWRM is established in policy-rhetoric, success on the ground is still far from being achieved (Mitchell and Hollick, 1993; Lenschow, 2002; Molle, 2006; Kennedy *et al.*, 2009). The development of effective water management across the world is hindered by technical and economic barriers, limited knowledge, and the slow pace of social change and legal reforms (Everard *et al.*, 2009). Practitioners have shown increasing interest in identifying factors underpinning successful policy and institutional reform agendas (GWP, 2009).

In the academic literature, research on adaptive governance (Dietz *et al.*, 2003; Folke *et al.*, 2005) has taken up the task of examining processes in society increasing its capacity to deal with environmental and social crisis. Research on adaptive governance is grounded in the view that social-ecological problems may be so complex and multi-dimensional that perfect solutions may not exist at any one time. The challenge is to create the conditions and decision-making systems that continuously question the status-quo, foster reflection, and promote collective action to respond to environmental and social issues. Adaptive water governance in particular is a growing, yet incomplete, field of research (Huitema *et al.*, 2009; Pahl-Wostl, 2010). Further elaboration and evaluation are needed to understand the implications of an adaptive approach for water management and policy.

This thesis evaluates principles of adaptive governance in the context of the emergence of integrated, ecosystem-based flood management in Scottish policies. Findings improve the understanding of adaptive governance in a policy context, and the implications of adaptive governance for flood management. The first section of this Chapter presents the context in which adaptive water governance arose, in particular academic debates on the implications of sustainability for water and flood management. The second section presents the concept of adaptive governance, and its application to the governance of water management. The last section presents the research objectives and approach, finishing with an outline of the thesis.

1.1. GOVERNING SUSTAINABLE WATER MANAGEMENT

This section presents the context in which interest in adaptive water governance arose. The section starts by presenting two core ideas underpinning sustainable water management: the role of ecosystems in providing essential functions and services to society, and the role of integrated management, through IWRM, in mainstreaming water management in governmental decision-making. Difficulties with implementing integrated, ecosystem-based management are then discussed. The idea of complex problem is used to illustrate the challenges raised by non-linearity, limited knowledge, and the influence of social and political factors in water and flood management. The section concludes on the need for further research examining the ways in which societal change for sustainable water management can be facilitated.

1.1.1. Integrated, Ecosystem-based Water Management

Sustainability has slowly become a normative dimension of good governance in modern society (Jordan, 2008). The Brundtland report popularised the term through its definition of sustainable development, identified as the moral obligation to meet the demand of current generations and maintain the capacity of future generations to meet theirs (WCED, 1987). The report also emphasised that, to become more sustainable, social and technological systems must change to better take into account the opportunities and limitations set by the natural environment.

Loucks (2000, p. 8) defined sustainable water management as “*water resource systems designed and managed to fully contribute to the objectives of society, now and in the future, while maintaining their ecological, environmental, and hydrological integrity*”. In this view, water management may not focus on a few hydrological processes (e.g. focusing on in-stream hydrology or large fluvial floods), but consider the whole diversity of hydrological processes (e.g. taking

into account catchment wide hydrology or other types of floods³), and the contributions that ecosystems may bring. Water ecosystems are not seen solely as a resource or a threat to society (e.g. floods), but also as providing important functions and services to society. Wetlands for example may remove sediments and pollutants when landscape run-off and river flows percolate through wetland vegetation and soils, resulting in better water quality for drinking water purposes, food production, and recreational activities. Flood flows may improve fisheries, and create diverse landscape, good for biodiversity and potentially attractive for recreation and tourism. Flood waters may deposit nutrients on floodplains increasing soil fertility and agricultural productivity (WMO, 2009). Ecosystems across the whole catchment may contribute to alleviating flooding by slowing and storing landscape run-off and flood waters (Weather and Evans, 2009).

The concept of IWRM incorporates many ideas of a sustainable, ecosystem-based approach to water management. The Global Water Partnership's definition of IWRM is one of the most quoted: *"a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems"* (GWP, 2000, p. 22). The definition refers to the sustainability of ecological systems, but also emphasises other ideas of sustainability, such as the need to take into account economic and social dimensions. IWRM promotes better coordination between the activities of individual citizens, businesses, and organisations involved in water, land and other relevant policies. This is to minimise conflicting investments and maximise mutual benefits. Such coordination should ideally occur amongst all social actors impacting environmental processes across relevant hydrological scales (e.g. river reach, water body, catchments, river basins, globally). Stakeholder participation is strongly advocated because it enables people being impacted by water management projects to become involved in

³ Many different types of floods exist and vary widely in their causes and impacts (Smith and Ward, 1998). Typical fluvial floods result from a high discharge of rain-water or the fast melting of snow cover into the river channel resulting in over-spilling on the floodplain. Intense rainfall may result in overland sheet-like floods. The capacity of urban storm-water drains may be exceeded, resulting in pluvial flooding. Floods can also be the result of higher groundwater tables, or be triggered by temporary sea level rise in estuaries and coastal areas.

decision-making. Integration of interests, knowledge and values is therefore a core principle of IWRM.

In flood management, similar thinking for an integrated, ecosystem-based approach was translated through sustainable flood management (Werritty, 2006; Shrubsole, 2007), integrated flood management (Alphen and Lodder, 2006; Grabs *et al.*, 2007) and, perhaps more commonly, especially in the hydrological sciences, flood risk management (Everard *et al.*, 2009). These views share the principle that one intervention should not be prioritised over another, but may aim for a context sensitive mix of 1) land drainage, river engineering and flood defences to increase water conveyance in the river channel and reduce the risk of over-spilling, 2) spatial development control to regulate urban sprawling and reduce exposure to flooding, 3) emergency and recovery services to reduce the potential consequences of flooding, and 4) catchment land management to slow and store landscape run-off and flood waters (Werritty, 2006; Everard *et al.*, 2009). To achieve that balance, flood management is to be underpinned by strong collaboration between stakeholders.

Overall, integrated, ecosystem-based management, as epitomised by IWRM, is becoming the dominant paradigm for water management (Biswas, 2004; Molle, 2008). For example, the EU Water Framework Directive⁴ (the EU WFD) and, more recently, the EU Floods Directive⁵ contribute to implementing such an approach in European policy (Moss, 2004; 2007). However many scholars observe that IWRM is falling to be transferred into practice (Blomquist and Shlager, 2005; Mollinga *et al.*, 2007; Molle, 2008). The following sub-section examines in more detail the scientific and social challenges that an integrated, ecosystem-based approach to water management entails.

⁴ Directive (2000/60/EC) of the European Parliament and of the Council Establishing a Framework for Community Action in the Field of Water Policy.

⁵ Directive (2007/60/EC) of the European Parliament and of the Council on the Assessment and Management of Flood Risks.

1.1.2. Implementing an Integrated, Ecosystem-based Approach

Environmental problems have often been described as “complex” or “wicked”. Problems are complex when social actors do not, and cannot, agree on a single list of descriptive criteria of the problem. This is because they have multiple dimensions, and multiple cause-and-effect relationships that cannot be traced easily (Rittel and Webler, 1973). Complex problems pose particular challenges for public policies for two interacting reasons. First, a solution to a complex problem for one actor may often cause a problem for another. Second, in situations of irreducible uncertainties, no “perfect” solutions may be readily identifiable. Complex problems may require value judgements in decision-making. Decisions may be taken based on equally valid options, but entailing significant differences as to the distribution of costs and benefits.

Water issues are essentially complex because they are embedded in interlinked social-ecological systems, underpinned by non-linear and poorly understood positive and negative feedbacks (Pahl-Wostl, 2007a). Flood risk for example is not only dependent on the probability of the hydrological hazard (e.g. the likelihood that a flood may occur based on physical factors, such as meteorology, land use, etc), but also on the exposure of a population to the hazard, and its susceptibility to damages (i.e. its vulnerability) (Kron, 2002). Flood risk is related to people’s decisions to avoid, mitigate and alleviate the flood hazard (Burton *et al.*, 1993). It is also related to the underpinning social and political factors influencing people’s decisions (Brooks, 2003; Adger, 2006). Historic attempts at managing flood risk show how this complex relationship can produce unexpected outcomes. For example, traditional interventions for flood management such as the building of flood embankments and walls to protect property in the floodplain were shown to create an incentive to live and develop areas initially exposed to flooding (Parker, 1995). Thus, flood risk may, over time, increase because the potential for damages increases. Damages can be higher in the situation where flood defences are over-topped by a flood that exceeds their design standard, or fail due to lack of maintenance.

Current controversies in implementing an integrated, ecosystem-based approach to flood management further illustrate the complexity of water issues. The selection of traditional interventions for flood management is underpinned by well-developed assessment techniques which yield relatively confident information with regards to their effectiveness in protecting people and properties. Practitioners and social actors wishing to protect their properties can rely on well-developed assessment techniques. Traditional interventions may however, in some cases, increase flood risk downstream. They may also impact the ecological integrity of the water environment. They may therefore be opposed by social actors who become exposed to the risk downstream, or by those who highly value environmental protection (Purseglove, 1989; Scrase and Sheate, 2005).

In contrast, ecosystem-based interventions in flood management may include measures such as the restoration of natural habitats on farmed landscape to slow and store flood waters. Such interventions may be favoured by environmental organisations who value their contribution in improving the quality of the environment. They may also be greeted positively by communities living downstream because most interventions occur upstream. However, ecosystem-based interventions have also several issues. Their effectiveness remains highly uncertain (Weather and Evans, 2009; Parrott *et al.*, 2009). Their costs and benefits relative to traditional measures are also difficult to estimate (Gonzales, 2006; Johnson *et al.*, 2007; Everard *et al.*, 2009). Finally, ecosystem-based interventions may receive opposition from impacted upstream communities (e.g. agricultural businesses, see Kenyon *et al.*, 2008; Posthumus *et al.*, 2008).

As described above, solutions to complex water problems may result in multiple, poorly-understood impacts distributed amongst multiple social actors. Improved scientific knowledge and methodologies may help reduce controversies around the effectiveness and the distribution of costs and benefits of ecosystem-based measures (e.g. Soulsby *et al.*, 2002), and help future decision-making. However, social factors (e.g. conflicting beliefs, values and interests) may remain. To overcome conflict and enable compromises, IWRM calls for inclusive decision-making based on participative processes between relevant social actors, with the

aim to foster collaboration (Biswas, 2004). As yet however, there is little evidence that more inclusive decision-making has led to improved outcomes in environmental improvements or even reduced conflict (Reed, 2008). Many scholars question the blanket use of participative processes and collaboration in water management (Lubell, 2004; Bloomquist and Schlager, 2005; Molle *et al.*, 2008). For them, the emphasis on good science and rational deliberation in current prescriptions of participative processes fails to acknowledge the political dimensions of water management, where social actors actively exploit institutions (e.g. laws, regulations, policies, norms) to impose interventions that suit their interests or their “*wider conception of the common good*” (Molle *et al.*, 2008, p. 361). Imperial (2005) sees collaboration as one strategy amongst others, because a focus on collaboration can lead to ignoring certain problems. Also, conflicts can stimulate learning and change. Other strategies such as policy change, litigation, lobbying, and legislative action can be more effective in solving water problems.

Overall, finding ways to prioritise or blend different, often opposing, beliefs, values and interests is the great challenge of implementing integrated, ecosystem-based water management. Adaptive governance is a recent concept, first coined by Dietz *et al.* (2003, p. 203) in the context of governing the environment to “*convey the difficulty of control, the need to proceed in the face of substantial uncertainty, and the importance of dealing with diversity and reconciling conflict among people and groups who differ in values, interests, perspectives, power, and the kinds of information they bring to situations*”. The term arose as an attempt to deal with questions of sustainability, complexity and multi-level governance, and is therefore particularly well-suited to examine further the challenges of governing sustainable water management, as presented in the next section.

1.2. ADAPTIVE GOVERNANCE AND WATER MANAGEMENT

This section presents the concept of adaptive governance and the implications for water management. This section starts by tracing the evolution of the concept of

“adaptability” in environmental management. It presents how research interest has broadened from a focus on management systems to whole multi-level governance systems. The challenges of a governance approach to examining the adaptability of social-ecological systems are explored. Finally, past applications of adaptive governance in water and flood management are discussed.

1.2.1. Adaptive Management: Managing Complexity in Ecological Systems

The concept of adaptability in environmental management has increased in popularity since the late 1970s in research on ecological systems and natural resource management (Holling, 1978; Lee, 1999). It arose as a critique of scientific, expert-led management which may ignore the complexities of ecological systems and the uncertainties inherent in predicting the impact of specific management regimes. A core objective of adaptive management is to increase the resilience of ecological systems. Holling (1973) defined ecological resilience as the ability of ecological systems to absorb disturbance and maintain in the process key relationships. Adaptive management posits that management regimes should be regularly adjusted to changes in the ecological system being managed and managers’ understanding of it (Nelson *et al.*, 2007). Management is seen as an experiment situated in a cyclical process of holistic appraisal, goal-setting, formulation of management options, implementation, and systematic monitoring.

Three forms of adaptive management have been differentiated based on the way management regimes deal with uncertainties in the behaviour of ecological systems (Walters and Holling, 1990). The evolutionary form is a trial and error approach, moving progressively from early haphazard choices to a sub-set of them which prove more successful. Passive forms refer to a management approach that implements a single optimum response informed by historical implementation. Active forms use alternative responses to create a balanced approach between short-term performance and long-term value. Active forms of adaptive management may perform better under high uncertainty because they do not lock management into an optimum approach. Rather, they acknowledge the

weaknesses of new management regimes, encourage actively the consideration of alternative regimes, and promote a culture of testing and learning.

Early adaptive management research focused on how human activities and specific management programmes impacted ecological systems and their resilience. The late 1990s and 2000s saw a broadening application of the idea of adaptability into the broader social and governance systems. In the next two sub-sections, the concept of governance and adaptive governance are further examined.

1.2.2. Governance: a Multi-Level Perspective of Social Systems

Governance itself is a widely used term, yet its meaning is debated. Kooiman (1993, p. 2) defines governance as *“the patterns that emerge from the governing activities of social, political and administrative actors”*, hereby differentiating the term from the act of governing that is a *“purposeful effort to guide, steer, control or manage societies”*. Governance has a wider meaning than government: it includes *“the whole range of institutions and relationships involved in the process of governing”* (Pierre and Peters, 2000, p. 1). Multiple definitions of institutions exist in the literature (see e.g. Young *et al.*, 2008; Mahoney and Thelen, 2010). Dovers and Hezri (2010, p. 222) define institutions as *“predictable arrangements, laws, processes or custom serving to structure political, social, cultural or economic transactions in a society”*. They may include for example social norms, taboos, constitutions and legal regimes.

The term governance has been used in particular to describe the changing relationship between government and contemporary society (Roseneau, 1992; Pierre and Peters, 2000; Jordan, 2008). A governance perspective typically represents society as a polycentric system where numerous social actors contribute to influencing issues of public concerns. Some accounts of governance would argue that most power is now controlled by private actors, civil society (e.g. the voluntary sector) and other non-governmental actors, rather than the

state. In more moderate accounts, government may have become one actor amongst others, but it has maintained some influence. In a government-centred perspective, polycentric governance has been defined as the situation where *“political authority is dispersed across separately constituted bodies with overlapping jurisdictions that do not stand in hierarchical relationship to each other”*, where jurisdictions refer to *“the political and legal competence of a unit of government to operate within a spatial and functional realm”* (Skelcher, 2005, p. 89).

In particular, governments control public policy-making processes. Public policies are the main tool of government, setting out specific programmes, instruments and interventions used to solve a collective issue. Dovers and Hezri (2010, p. 222) defined them as *“positions taken and communicated by governments, avowal of intent recognising a problem and in general terms stating what is going to be done about it”*. In a public policy context, polycentricism refer not only to the distribution of power between governmental and non-governmental actors, but also to the distribution of power across government departments and public agencies involved in making decisions over a policy.

If modern society is characterised by more distributed power, the concept of governance can be used to raise questions of control, and coordination in society (Jordan, 2008), and the ways in which they are exercised. For example, Howlett (2009) differentiates between four modes of governance. Legal governance is based on compliance through the promotion of law and order in social relationships. Legislation, law and regulations are used to influence society. Corporatist governance is based on the management of social organisations through bureaucracies or bargaining with other major social actors. Market governance is based on the competition and promotion of small and medium sized-companies, through for example contracts, subsidies, incentives and penalties. Finally, network governance is based on the promotion of inter-actor organisational activity, through for example participative processes supporting collaboration.

Governance has also been associated with debates regarding “good governance”. Good governance usually refers to a list of quality normative criteria against which the performance of public actors can be assessed. They generally include accountability, legitimacy, justice (e.g. human rights), transparency, efficiency and the rule of law (Weiss, 2000). The evaluation of the relevance and usefulness of these normative criteria in an empirical context represents a major stream of research in sustainable development (Jordan, 2008). Policy evaluations of political systems by international organisations also use these criteria (e.g. World Bank, UN, OECD).

Overall, governance appears to have different meanings, but, despite this ambiguity, the concept is useful to conceptualise the multi-level nature of complex, modern social systems. It is now widely used in the analysis of complex social-ecological systems (i.e. the web of interactions between ecosystems and society) (Berkes and Folke, 1998; Duit *et al.*, 2010). Complex social-ecological systems are characterised by openness (e.g. change is not bounded), multiple equilibria (e.g. systems can stabilise temporary in different configurations), thresholds (e.g. small events might result in irreversible change), surprises (e.g. because of poorly understood positive and negative feedbacks), and cascading effects (e.g. triggering systemic change and failure) (Gunderson and Holling 2002; Duit and Galaz, 2008). The application of the idea of adaptability to the governance of complex social-ecological systems represents a recent development, further explored in the next sub-section.

1.2.3. The Adaptability of Governance Systems

The early 2000s represent the main start of research on the adaptability of governance systems with significant publications such as Gunderson and Holling, (2002), Dietz *et al.* (2003) and Folke *et al.* (2005). Nelson *et al.* (2007) observed that these developments are grounded in the combination of research on ecological resilience, adaptive management, and environmental self-governance (see e.g. Ostrom, 1990), explaining the origin of some of the core principles now

characterising adaptive governance, such as resilience of social-ecological systems, community-led management, polycentric governance, collaboration, and experimentation. They are discussed below.

As discussed earlier, resilience is a core target of adaptive management. Resilience theory is now frequently used for analysing the adaptability of complex social-ecological systems (Gallopín, 2006; Duit *et al.*, 2010). It is however a hotly debated concept both in the ecological sciences (Klein *et al.*, 2003) and social sciences (Duit *et al.*, 2010). In particular, it raises questions with regards to the desired type of change for social-ecological systems. What is a good and bad change (e.g. change for one species/social actor might be bad for another one)? Should social-ecological systems be robust and avoid any change? Should they be allowed to change after disturbance, but then return to their original state? Should they form a new state of equilibrium? Or, should they continuously adapt to disturbances and change (and thereby have no resilience at all)? In their seminal paper on adaptive governance, Folke *et al.* (2005) argues that effective adaptive governance is when a social-ecological system has the capacity to turn changing conditions and perturbations into an opportunity to re-organise internally and shape the direction of change. In their view, the direction of change should be greater sustainability, in particular an ecosystem-based approach to environmental management.

Using resilience theory for whole social-ecological systems, instead of ecological systems, raises questions with regards to the role of knowledge, reflection and power in influencing change in social groups (Duit *et al.*, 2010). Past research on adaptive governance highlights in particular the beneficial impact of community-led natural resource management (Folke *et al.*, 2005; Nelson *et al.*, 2007). Communities may be neglected in traditional centralised, scientific and expert based management. However, communities may be more aware and knowledgeable of changes in local ecological conditions, and may be more capable of adapting adequately using relevant experiences and institutions. For adaptive governance therefore, decision-making at the lowest level may be preferable because it is more relevant and responsive to local issues and concerns.

Not all communities are capable of being adaptive. Fabricius *et al.* (2007) identified some key conditions for effective community-led adaptive governance. These include internal factors to the community, such as highly motivated leadership and skilled members, and external factors, such as access to resources, knowledge, and enabling policies.

Adaptive governance does not solely value local decision-making, but recognises the importance of linking with higher levels of governance because higher organisational levels can improve social response to ecological dynamics (Folke *et al.*, 2005). The ideal for adaptive governance is to have polycentric forms of governance where quasi-autonomous decision-making units operate at multiple spatial scales, so that individuals and organisations have self-organising capacities. Polycentric governance may increase resilience by creating conditions for the development of multiple, independent experience at appropriate scales of intervention, spreading risks in social-ecological systems, and allowing the failure of individual units without compromising the whole (Huiteima *et al.*, 2009). The aim is to reach a balance between decentralised and centralised control, ensure synergies between organisational levels, and avoid conflicting interventions.

A premise in adaptive governance for community-led and polycentric governance does not necessarily call for extreme cases of decentralised and fragmented structures of decision-making; instead, participative processes and co-management are called for in order to increase the capacity of actors to mobilise knowledge and resources for action (Olsson *et al.*, 2004; Hatfield-Dodds *et al.*, 2007). Here, research on social learning has been used to improve the understanding of reflexivity in strengthening collaboration and knowledge exchange between stakeholders (Armitage *et al.*, 2008). Participation of citizens in decision-making is seen as a way to generate new knowledge but also better implement policies because enforcement is not by sanction but by learning, and changing social actors' relationships, understanding, values and norms.

As discussed in an earlier section, adaptive management call for a culture of testing, monitoring and learning in natural resource management. In particular, the

idea of experimentation expresses the need to transform new knowledge into social practices. In adaptive governance, experimentation brings attention to processes fostering knowledge acquisition, diffusion and implementation across society (Folke *et al.*, 2005). Huitema *et al.* (2009) differentiates between “research” and “management” experimentation. Experimentation in the research approach refers to the theoretical testing of policy options on social-ecological dynamics to provide a scientific basis to decision-making. Experimentation in the management approach goes a step further by seeing the implementation of policy options as an experiment in itself (as would adaptive management do) to further maintain flexibility in social-ecological systems.

Critics stress that experiments can avoid challenging appropriateness of policy goals or conventional wisdom, and can be used to justify policies or as advocacy instruments when social actors select evidence and interpretations (Huitema *et al.*, 2009). Both approaches are not value-free: the choice of methods and criteria, and the interpretation and presentation of results are influenced by the people involved (Huitema *et al.*, 2009). Traditionally, both research and management experiments have tended to be led by experts rather than lay participants, resulting in rather authoritative, top-down experimentation. In adaptive governance, they are to be preferably led by the local community at bio-regional level (e.g. catchment) in order to foster learning at the right scale for sustainability (Olsson *et al.*, 2004). As seen above, questions remain with regards to linkages to other relevant governance levels.

Overall, adaptive governance provides a useful conceptual lens to analyse the governance of complex problems, and adds a normative element to governance through its assumptions in favour of community-led management, polycentric governance, collaboration, and learning, against which processes of governance can be examined. The following sub-section explores in more detail the emerging field of adaptive water governance.

1.2.4. Adaptive Water Governance: an Emerging Field of Enquiry

Scholars taking an adaptive governance perspective in water management often emphasise that water management regimes are poor at adapting to environmental and socio-economic changes, and at taking on new ideas. For example, Pahl-Wostl (2007b) observes that, historically, water management has been characterised by large-scale technological interventions, rigid regulations, and the dominance of expert knowledge. Several studies point out that water management regimes tend to be stable (e.g. have a tendency to use certain types of interventions over long periods of time), and they highlight the role of crisis in inducing change (Krysanova *et al.* 2008; Huntjens *et al.*, 2011; Meijerink and Huitema, 2010). Crisis may be a flood, drought, the deterioration of water quality, or political elections. Individual or organisational leadership is an important element to successfully exploit these perturbations (Meijerink and Huitema, 2010), an observation reflected in the broader adaptive governance literature (Folke *et al.*, 2005; Olsson *et al.*, 2004; 2006).

Transformation of the social-ecological system in adaptive water governance is often measured in terms of policy change (Johnson *et al.*, 2005; Meijerink and Huitema, 2010) or the type of interventions (Krysanova *et al.*, 2008; Huntjens *et al.*, 2011). Past research nevertheless points out that change is difficult to measure. New policies and interventions may not necessarily be fully implemented, and may in reality be combinations of old and new recipes (Meijerink and Huitema, 2010). For Huitema *et al.* (2009), diversity in the type of interventions implemented may be beneficial for building resilience because interventions can then be tested, re-designed, and replaced.

Galaz (2007) evaluates the degree to which IWRM, as promoted by international institutions (e.g. Global Water Partnership), includes recommendations that increase the resilience of social-ecological systems. He observes a number of synergistic recommendations such as the need to take an ecosystem-based approach, integrate national policies, link bottom-up with top-down strategies, and encourage monitoring and risk assessments. He also points out to gaps. For

example, IWRM fails to consider thresholds and surprises, and does not recommend the need to prepare adequate strategies to cope with them. Also, IWRM calls for public participation, but fails to recognise the need for learning processes, and for treating policies as experiments. Medema *et al.* (2008) observe that an adaptive approach to IWRM may be structured around iterative cycles of joint policy formulation and implementation resulting in the strengthening of inter-personal trust, reciprocity and creativity. However, the authors also warn that this may not necessarily improve IWRM implementation because adaptive processes may be constrained by the same problems that IWRM faces, in particular the lack of institutional capacity and sustained political conflicts between stakeholders.

IWRM may see polycentric governance as a threat because policies and interventions may then conflict with each other. In contrast, adaptive water governance would not necessarily regard polycentric systems as a disadvantage, but rather as a potential source of resilience and adaptability to environmental and social change and perturbations. River basin organisations, where all powers for water and land use management are concentrated in one organisation, are therefore not necessarily an adequate form of governance; rather the focus should be on enabling self-emerging forms of collaboration (Ferreira *et al.*, 2008; Fish *et al.*, 2009; Booher and Innes, 2010). Several scholars criticise the dependence of locally-led management regimes on national policies and institutions (e.g. Naess *et al.*, 2005; Ferreira *et al.*, 2008). Other scholars specifically call for a balance between top-down and bottom-up control (Fish *et al.*, 2009; Pahl-Wostl *et al.*, 2010).

Some research on adaptive water governance has focused on how to foster collaboration, in particular through participative processes and social learning (Mostert and Pahl-Wostl, 2010; Huntjens *et al.*, 2011). Central to successful collaboration are the mechanisms used to connect stakeholders together, expose individual perspectives and preferences, exchange knowledge and values, and create shared understanding and a sense of responsibility towards each others (Pahl-Wostl *et al.*, 2008; Ison *et al.*, 2011). Social, environmental, economic and

political context may however have a large influence on the success of the engagement process, and its outcomes. Informal participative processes are thought more successful than formal mechanisms (e.g. statutory) (Pahl-Wostl *et al.*, 2010).

Some scholars of adaptive water governance question the benefits of polycentric governance and collaboration for the adaptability of social-ecological systems. Huitema *et al.* (2009) warn that polycentric water governance may be accompanied by a loss of economies of scale, complex decision-making, and high transaction costs. The authors observe also that there is little evidence that polycentric systems are more flexible, better reflect local conditions, result in more learning, or are more effective in terms of environmental outcomes. Mollenkamp *et al.* (2007) observe that polycentric governance can lead to loss of accountability, legitimacy and effectiveness in decision-making. For example, responsibility is more difficult to track down in collaborative decision-making because multiple actors are involved in the decision. Finally, Kallis *et al.* (2009) also point out that it is unclear what institutional design is required to maintain over time the self-organising capacity of informal engagement processes, and make sure decisions are legitimate and accountable.

Overall, adaptive water governance is a promising, but still emerging field of research. Governance principles arising from adaptive governance in favour of community-led management, polycentric governance, collaboration, and learning have started to be examined in water management systems. Most of the early research focused on the formulation of policies at the level of the river basin, although it appears that other levels of governance (e.g. national, federal) have a critical role in influencing the local level. Recommendations and observations with regards to the appropriate practices, policies and institutions for adaptive water governance remain ambiguous and inconsistent, in particular with more established field of research (e.g. IWRM). Further empirical evaluations and theoretical developments are needed (Folke *et al.*, 2005; Huitema *et al.*, 2009; Pahl-Wostl *et al.*, 2010). Building on these observations, the next section presents the objectives and approach of the research reported in this thesis.

1.3. RESEARCH OBJECTIVES AND APPROACH

1.3.1. Objectives

This thesis aims to improve the understanding of adaptive water governance. It draws on a particular stream of political research, the policy sciences, to improve this understanding. Research on the policy process provides multiple theories, concepts and frameworks to examine public governance and understand the role of government and public institutions in managing problems of public concern (Hudson and Lowe, 2004; Sabatier, 2009; Hill and Hupe, 2009). Using research on the policy process can help understand complex water problems in social-ecological systems. Amongst the literature reviewed, work drawing on theories of the policy process, in particular policy change, public participation and social learning⁶, and institutional analysis have successfully informed, strengthened and extended the understanding of adaptive water governance (e.g. Huitema and Meijerink, 2010; Pahl-Wostl *et al.*, 2010). Little work has however used the full range of theoretical insights from the policy sciences, for example work on policy learning, policy integration, and implementation.

The more specific objectives of the thesis are therefore to:

- Evaluate principles of adaptive water governance and draw lessons of policy relevance, by:
- Using the policy sciences to better conceptualise the governance of complex water problems, and by:
- Examining empirically the formulation and implementation of integrated, ecosystem-based water management in a national jurisdiction.

A case-study approach was selected to carry out the empirical investigation for several reasons. Case-studies are good at theory building and testing (George and

⁶ Theories on social learning and public participation did not arise from the policy sciences, but their frequent use in examining environmental policy makes them particularly adapted to the objectives of the thesis. Also, social learning is closely associated with work on policy learning, and public participation is recognised as a core dimension of the policy process (e.g. Considine, 2004; Hill and Hupe, 2009).

Bennett, 2005; Flyvberg, 2006). The in-depth examination of a social phenomenon allows for rich descriptions, the identification of multiple, potentially new variables and the discovery of causal explanations. Further, case-studies are good at capturing process and context, and at dealing with complexity in social dynamics (George and Bennett, 2005) and social-ecological systems (Duit *et al.*, 2010). The case-study is presented in the next sub-section.

1.3.2. Integrated Flood and Rural Land Management in Scotland

The thesis examines the formulation and implementation of an integrated, ecosystem-based approach in flood management in Scotland. Table 1.1 presents some key physical and social characteristics of Scotland. Fluvial and coastal flood risk is a significant issue in Scotland. Estimates range from 171,000 properties at risk of fluvial and coastal flood risk (100-year period, not considering existing flood defences; Werritty *et al.*, 2002) and 125,000 properties at risk of fluvial, coastal and pluvial flood risk (200-year return period, considering existing flood defences and potential impact of climate change; SEPA, 2011b). In same later assessment (SEPA, 2011b), inland, pluvial and coastal flooding accounts for 45%, 38%, and 17% of all predicted impacts. The annual average damage due to flooding to homes, businesses and agriculture is estimated to be between £720 million and £850 million.

Recent years have seen a major change in the way flood risk is managed in Scotland. Water and flood policies now recognise ecosystem-based approaches, in part driven by the EU WFD and the EU Floods Directive. Both reform agenda require the setting up of the catchment approach, cyclical management planning, the use of stakeholder participation, and stronger policy integration to improve water and flood management. The EU WFD in particular puts in place challenging objectives in terms of environmental improvements. The EU Floods Directive does not set specific targets, but its transposition in Scotland, the Flood Risk Management (Scotland) Act 2009 (the 2009 Act), encourages a stronger

ecosystem-based approach, and includes instruments to implement rural land management change at the catchment scale.

Table 1.1 – Some key characteristics of Scotland (Source: Werritty *et al.*, 2002; SG, 2010c; SEPA, 2011b)

Population	5,168,500 (83% in urban areas)
Area	78,791 km ²
Topography (highest point)	1,144m
Climate	1,390mm average rainfall (1961-1990)
Main land use characteristics	Agricultural land: 6.2 million ha (80%) Including Rough Grazing (3.8 million ha); Grass (1.4 million ha); Crop, Fallow and Set-Aside (0.6 million ha); Woodland and Others (0.2 million ha) Woodlands and forests: 1.3 million ha (17%)
Flood risk	200-year flood, including protection from flood defences and impact of climate change: 125,000 properties 100-year flood, not including protection from flood defences and impact of climate change: 171,000 properties
Political system	Pluralist, western democracy Member of the European Union Member of the United Kingdom

The Scottish transposition epitomises a major change in Scottish flood policy. The legislative and policy framework, hardly changed since the 1960s, had become under greater scrutiny since the mid-1990s, and, more intensively, since the early 2000s following severe flooding in these periods (Werritty, 2006). The formulation of a “sustainable” approach to flood management in national advisory groups for flood management was an important dimension of the reform agenda, in response to the combined impacts of widespread flood events in the mid-1990s and early 2000s, reduction of public spending, the threat of climate change, and the search for more environmentally-friendly management (Werritty, 2006). In addition to raising the profile of non-structural flood management measures (e.g. flood warning, awareness-raising, spatial planning control, insurance cover), reforms took account ideas of integrated, ecosystem-based management, partly supported by the EU WFD and EU Floods Directive, and by some in academic and policy circles in Scotland. Overall, the Scottish Government is now pursuing five objectives to achieve “flood risk management”: 1) a reduction in the number of people, homes and properties at risk of flooding, 2) rural and urban landscapes

to store and slow water, 3) integrated drainage decreasing the burden on sewers while reducing flood risk and improving the water environment, 4) improved public awareness of flood risk, and self-protection, and 5) long-term and adaptable flood management actions (SG, 2011a).

Within this dynamic, great attention was given in Scotland to the restoration of ecological systems at the catchment scale, with the aim of alleviating flooding by slowing or storing water, increasing soil infiltration, and reducing water flow connectivity across the landscape. Similar approaches had been taken since the late 1990s in urban areas through policy change in favour of alternative storm water drainage techniques (e.g. ponds, wetlands, permeable paving, filter strips, etc), known as Sustainable Urban Drainage Systems in Scotland (McKissock *et al.*, 2003). The concept of Natural Flood Management (e.g. Kenyon, 2007; WWF, 2007; 2008) as a sub-set of Sustainable Flood Management (SFM) was developed across the 2000s to cover the range of measures applicable in the rural landscape that aim to restore hydrological and morphological processes across a catchment, for example removing flood embankments or creating wetlands (Table 1.2). It is now institutionalised in the 2009 Act as “*the alteration or restoration of natural features and characteristics*”⁷.

As discussed earlier (see Governing Sustainable Water Management), the growth of an integrated, ecosystem-based approach in flood management, as exemplified by the use of the catchment as the management unit and the restoration of ecological systems as a management strategy, does not come without controversies and potential conflicts. In Britain in particular, the approach was embedded in major academic and policy debates across the 2000s (see e.g. Thorne *et al.*, 2007). Scientific reviews were carried out, and suggested that, while changes in rural land management may modify flood generation processes at field scale, there is still limited empirical evidence that they have an impact on flood risk at a catchment scale (e.g. Wilby *et al.*, 2008). Representing run off mechanisms in models is complex, and confident prediction of their impact on future flood risk is difficult (O’Connell *et al.*, 2007; Tetzlaff *et al.*, 2008; Merz *et*

⁷ Flood Risk Management (Scotland) Act (2009 Act), Part 3, Section 16 (1).

al., 2010). In parallel, research in Scotland suggests that implementation of such measures is hindered by lack of adequate methodologies to evaluate costs and benefits (Kenyon, 2007; Kenyon *et al.*, 2008) and potential opposition by rural communities, in particular farmers (Howgate and Kenyon, 2009).

Table 1.2 - Examples of rural land management techniques to alleviate flooding (i.e. natural flood management)

Measure	Impact for flood alleviation
Breach/remove embankments or set back from banks.	Provide temporary flood storage and improve habitat via episodic inundation of floodplain.
Create washlands, e.g. on agricultural land.	Provide temporary flood storage.
Create ponds/wetlands.	Raise local water table and increase surface and groundwater storage.
Block drainage ditches.	Slow down transmission of water from slopes to channel.
Block tile drains.	Slow down transmission of water within soil to channel.
Plant woodland on floodplain.	Increase roughness, flatten flood hydrograph and increase biodiversity.
Plant riparian woodland on tributaries.	Increase infiltration and storage of water in the soil.
Plant transverse woodland strips.	Increase infiltration and storage of water in the soil.
Introduce large woody debris.	Increase roughness, flatten flood hydrograph and locally improve habitat.
Reduce stocking densities.	Reduce compaction of soil, improve soil structure and increase infiltration.
Maintain paths.	Reduce area of surface which generate overland flow and sediment.

Adding to this complexity, new policy drivers in Scotland are increasingly intertwined with flood management and its rural dimensions, highlighting the considerable political interest in NFM and other land use changes for achieving multiple policy objectives. These include for example the Climate Change Adaptation Framework (SG, 2009a), the Land Use Strategy (SG, 2011b) and the ecosystem approach to countryside management (SNH, 2009a), all of which trying to provide more unified conceptual, methodological, and practical frameworks to implement integrated, ecosystem-based management.

Institutionally, Scotland presents a typical case of a pluralist, European representative democracy, but significantly influenced by modern ideas on

participative democracy (Ross *et al.*, 2009). Uniquely, Scotland recently experienced an important change in its political system. National flood policy was the responsibility of the central Scottish administration and the UK Parliament, until a Scottish Parliament was created in 1999, after three centuries of unified legislature. Powers over many policy issues -including flood management, environmental, rural and spatial planning policies- were devolved to a new Scottish legislature. The process of devolution in the UK presents a unique opportunity to study some of the suggestions from the adaptive governance literature about the impact of subsidiarity and nested decision-making on policy dynamics, in the context of a small legislature.

In the rest of this thesis, three terms are used for convenience and coherence. “Integrated flood and rural land management” is used to refer to integrated, ecosystem-based flood management, in particular the principles that call for more coherence between flood and rural land management policies and practices. Two components of integrated flood and rural land management are examined in the thesis: “catchment flood management” and “rural land management techniques”. Catchment flood management refers to the process of managing flood risk at the catchment level. Rural land management techniques refer to natural flood management techniques. In addition, “flood defences” refer to traditional means of managing flooding through measures such as dredging and the removal of gravel from river channels, river bank reinforcement, and the building of flood defences and embankments. On a last note on terminology, analyses of policy programmes related to integrated flood and rural management are presented in this thesis. They are generically referred to as: “flood policy”, “water policy”, “agricultural policy”, “rural development policy”, “forestry policy”, and “natural heritage policy” for convenience and coherence. Where clarification and precision are needed, specific elements of a policy are referred to instead of the generic term.

1.3.3. Research Approach

The thesis focuses on specific policy processes underpinning the formulation and implementation of integrated flood and rural land management in Scotland. The theoretical and methodological approaches were adapted to the processes examined in order to increase the parsimony, commensurability and coherence of the analytical process (Ritchie and Lewis, 2003). Each Chapter therefore provides a discussion of the research context, both empirical and theoretical, research methods, analytical process, results, and lessons-drawing for adaptive governance. In this sub-section, the overall research approach is presented, as well as the overall analytical process underpinning all Chapters.

An interest in the emergence of new policies and practices directs attention towards the structural and agential properties of social systems influencing patterns of stability and change in social-ecological systems. Structure is understood as social features that produce certainty and stasis in social life, such as legislative systems, norms and values (Sztompka, 1993). Agency is defined as social actors that constantly reaffirm, reject, realign or elaborate structural features (Sztompka, 1993). Given the wide variety of social structures and actors in social-ecological systems, the thesis can focus only on a selected number. Social actors included individual citizens and representatives of organisations impacting on, and impacted by, integrated flood and rural land management. Structures included formal institutions relevant to integrated flood and rural land management including policies, laws, and decision-making processes underpinning their formulation and implementation, such as statutory processes. When other structural variables were relevant for the studied phenomena, such as values and norms, they were also considered and reported.

Fundamentally, two ways of conceptualising social change can be distinguished (Hay, 2002). Structuralism explains social outcomes in terms of structural factors and therefore tends to assume limited free-choice in social actors' decision-making. Intentionalism explains social outcomes from the perspective of social actors and their capacity to modify social structures. The perspective in this thesis

is a pluralist one as the impact of structures and intentions are both valued. This is an appropriate philosophical stand when the research is primarily driven by problem-solving, as in this research, rather than methodology (Ritchie and Lewis, 2003). Analytical focus is on how social actors involved perceive, adhere, challenge, exploit, and modify policies and the processes underpinning the policy process.

As Ritchie and Lewis (2003) point out, using a primarily deductive approach, where hypothesis are developed theoretically and tested on data, is not ideal in qualitative research because much value of qualitative research is its capacity to identify new ideas. In contrast, pure inductivism, which allows the emergence of new concepts and causal relationships, may result in simplistic observations, lack of clarity and unstructured ideas. In this research, rigorous hypothesis-testing would have been difficult to perform using a purely deductive approach given the lack of research examining adaptive governance in policy processes in particular in the context of integrated flood and rural land management. A deductive framework could have limited the scope and novelty of the research, and ignored important (new) dimensions. The analytical process used in this thesis is based on a dialogue between a strong inductive process and theoretical perspectives on adaptive governance and the policy process, in order to harness the advantages of an inductive approach (e.g. identifying new patterns, building theory) while contributing to existing theoretical developments. In particular, the use of theories of the policy sciences (as an established field of research) strengthens data collection and the inference process following the inductive analysis.

Figure 1.1 shows the analytical process taken in this research. Different theories of the policy process (e.g. policy learning, policy change, policy integration, etc) are selected in each Chapter in coherence with the analytical focus of that Chapter (e.g. national policy formation, local policy implementation, etc). These theories inform the design of more specific questions used to probe documentary sources and social actors (e.g. inform survey templates) on areas of interest in a policy perspective. A primarily inductive approach is then used to analyse the data generated, using methods such as thematic analysis and process tracing (described

in individual chapters). Findings from the inductive analysis are compared with selected theories of the policy process. The outcomes of this comparison are compared to principles of adaptive governance. Overall, the research approach allows for appropriate generalisation through a transparent process of inferences and a continuous dialogue between empirical and theoretical knowledge (Ritchie and Lewis, 2003).

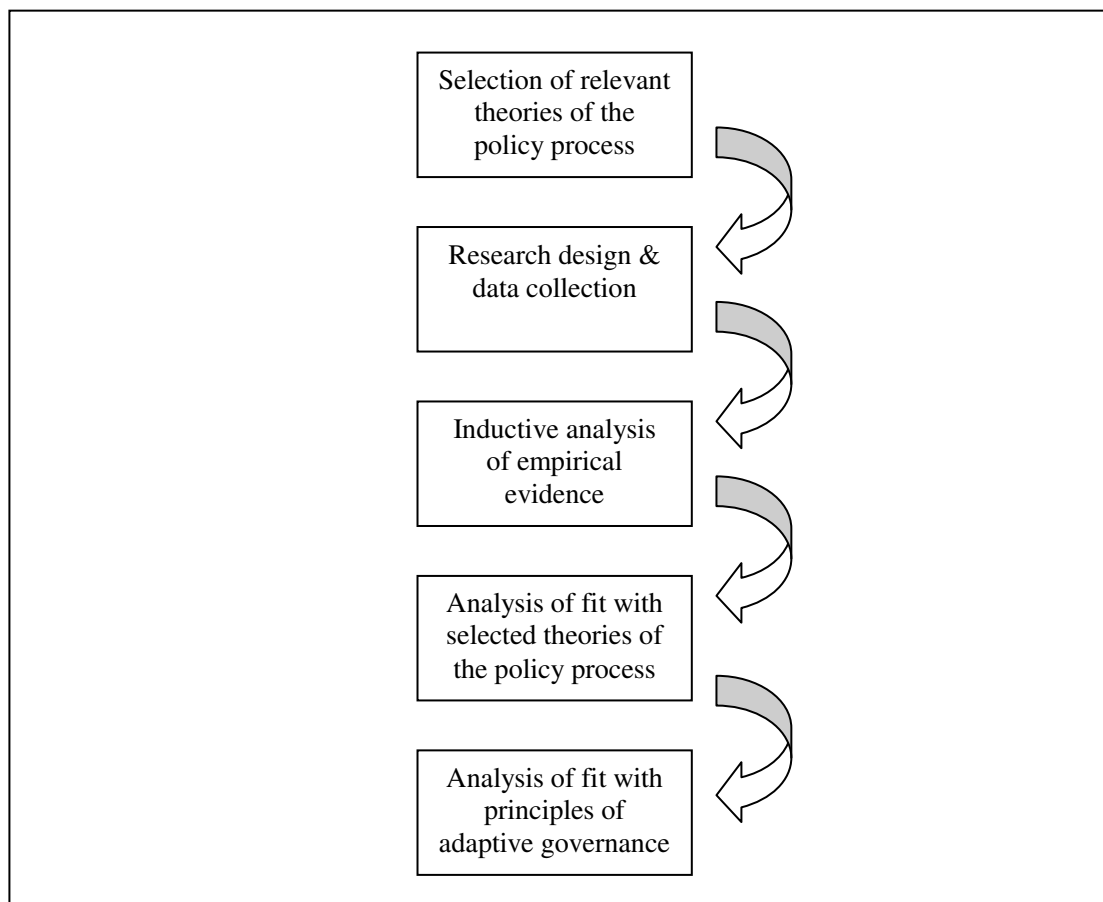


Figure 1.1 - Analytical process underpinning the research

To collect data, the thesis uses a combination of documentary analysis, interviews, and a semi-quantitative method, called Q Methodology (only in Chapter 5). Document analysis and interviews are known to yield rich, holistic explanatory data on complex and context sensitive phenomenon (e.g. complex water problems), as well as on deeply rooted individual perspectives and specialist

knowledge of social actors (e.g. attitudes and behaviours towards policies) (Ritchie and Lewis, 2003). More information on research methods and the analytical process is provided in individual Chapters.

1.4. STRUCTURE OF THE THESIS

The following research questions were developed based on research objectives, case-study, and research approach:

- How did integrated flood and rural land management emerge in national Scottish flood policy? (Chapter 2)
- How is integrated flood and rural land management embedded in relevant national policies? How do national stakeholders engage with the idea? What mechanisms influence national integration? (Chapter 3)
- How is integrated flood and rural land management embedded in relevant local policies? How do local stakeholders engage with the idea? What mechanisms enhance adoption? (Chapter 4 and Chapter 5)

Figure 1.2 presents the outline of the thesis. The arrow represents an open policy cycle, a reference to the conventional (but closed) policy cycle (e.g. agenda-setting, formulation, implementation, monitoring; see e.g. John, 1998). Its open nature symbolises open-ended change in social-ecological systems. Chapter 2 and Chapter 3 first deal with the national policy process. In Chapter 2, the evolution of Scottish national flood policy is examined, in particular between the 1950s, when the first major legislative framework on flood management was developed in Scotland, and the late 2000s, when the 2009 Act was enacted. Particular focus is on policy learning and change to understand the emergence of integrated flood and rural land management in Scottish flood policy. In Chapter 3, Scottish flood, water and other rural land management policies are examined to evaluate their degree of coherence on integrated flood and rural land management. Focus is also on how further integration is and can be enabled. Chapter 4 and Chapter 5 focus on the policy process at the local level. In Chapter 4, the implementation of

integrated flood and rural land management in two Scottish catchments is examined. Particular focus is on how social actors opposed or adhered to integrated flood and rural land management, and exploited existing policies in that regard. In Chapter 5, the implementation of integrated flood and rural land management is further examined in one Scottish catchment. Particular focus is on the impact of participative processes on the local uptake of integrated flood and rural land management. Chapter 2-5 are all structured in a similar way:

- Introduction to identify specific knowledge gaps;
- Theoretical framework to frame the research;
- Research design to present methods;
- Results from the inductive analysis;
- Discussion to compare results with other contexts, policy sciences concepts, and principles of adaptive governance;
- Conclusion to draw lessons from the findings.

The final Chapter 6 reflects on the outcomes of individual Chapters, suggests future avenues of research, and proposes policy recommendations for an adaptive approach to integrated, ecosystem-based flood management in Scotland.

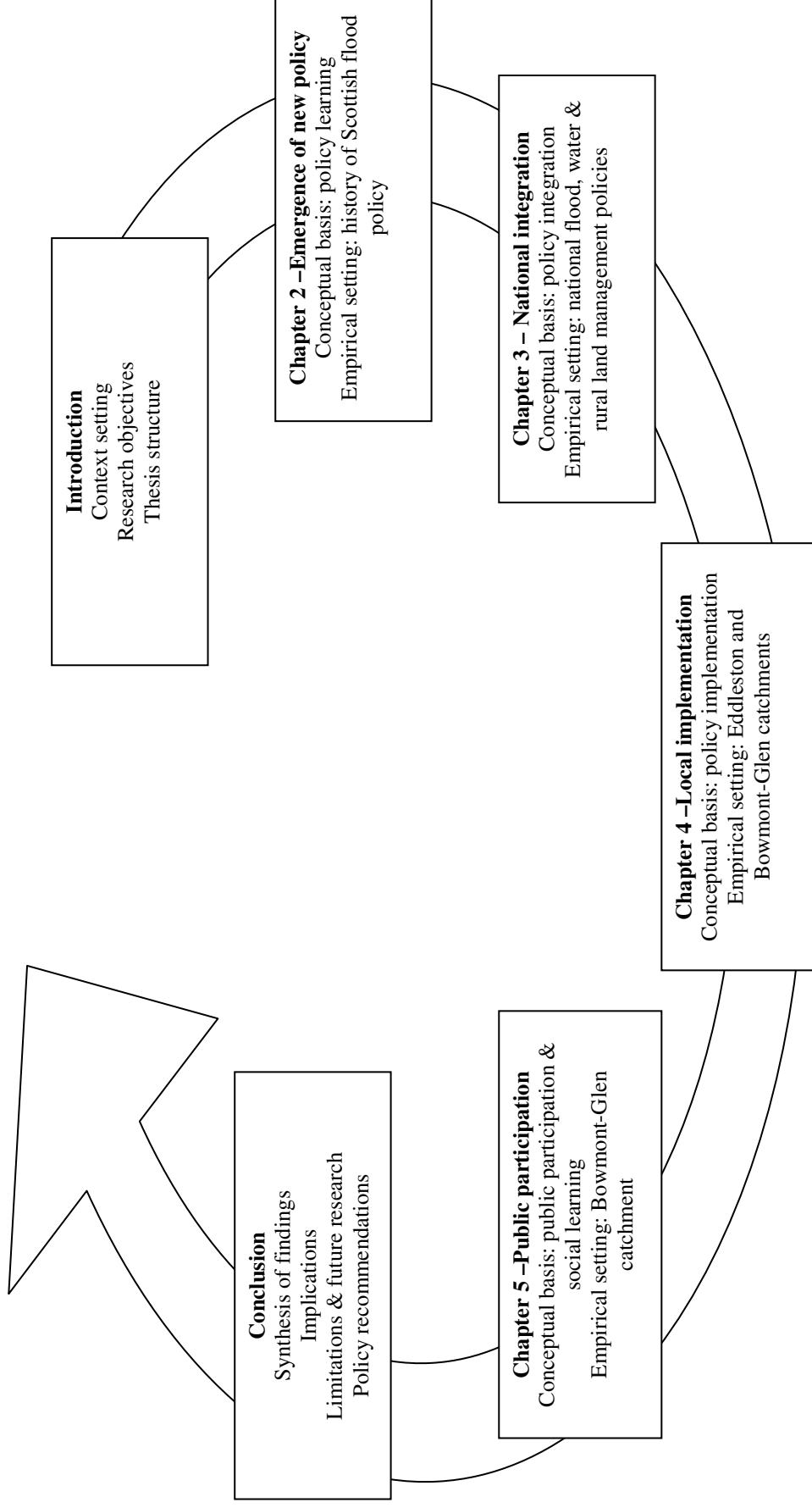


Figure 1.2 - Structure of the thesis

Chapter 2 The Emergence of Integrated Flood and Rural Land Management in National Flood Policy

2.1. INTRODUCTION

The aim of this Chapter is to evaluate ideas from adaptive water governance in the particular context of national policy processes. The formulation of integrated flood and rural land management in Scottish flood policy, and the drivers underpinning this process, are examined. After decades of inertia, flood policy moved up the Scottish political agenda in the 1990s and 2000s, culminating with the transposition of the EU Floods Directive through the enactment of the Flood Risk Management (Scotland) Act 2009 (the 2009 Act). As discussed in the overall Introduction, this statutory change epitomises a transition from a policy regime dominated by the building of flood defences to one for which the main emphasis is flood risk management.

Research on the history of Scottish flood policy only includes the study of Werritty (2006) focusing on the role of a governmental advisory group in developing ideas of Sustainable Flood Management (SFM). More research on flood policy change is available in the English context: Tunstall *et al.* (2004), Johnson *et al.* (2005) and Penning-Rowsell *et al.* (2006), all drawing from the same research project examining policy change for flood management and land drainage in the second half of the century. Scarse and Sheate (2005) provide an in-depth description of the way flooding and flood management have been framed in documents, from the middle-ages to the present day. Finally, Everard *et al.* (2009) identify phases in the understanding of flood processes, and how that impacted past policies. All studies reported above identify a progressive diversification of policy interventions, from encouraging land drainage and the

building of flood defences towards including other measures such as spatial development control, emergency planning, flood warning, and, more recently, catchment flood management and rural land management. Similar observations are made in the case of Canada (Schrubsole, 2007) and Bangladesh (Cook, 2010).

Amongst the cited work above, only Johnson *et al.* (2005) focus on the “mechanics” of policy change. They discuss the central role of large flood events in accelerating the rate of policy change and the role of charismatic policy actors in steering change. Further work was carried out by Dutch researchers. In a multiple case analysis of national water management regimes, Kissland-Naf and Kuks (2004) suggest that policy change is favoured by the perception of a significant problem for society, the disruption of a national water regime by international agreements (e.g. EU Directives), the greater participation of the public in decision-making, and leadership by organisations. Meijerink (2005) examines the role of coalitions of policy actors in influencing flood policy change in the Netherlands. Building on these ideas, Huitema and Meijerink (2010) examine the strategies of policy entrepreneurs for inducing water policy change. Overall, findings from these studies suggest that policy actors compete to shape policy change, and that events such as major floods create opportunities to accelerate the rate of change.

These studies fit well into some of the propositions made in the adaptive (water) governance literature on the role of crisis, power and leadership in inducing change in social-ecological systems (Folke *et al.*, 2005; Olsson *et al.*, 2004). However, change can be also induced through participative and learning processes (Armitage *et al.*, 2008; Diduck, 2010). Learning in adaptive water governance has been mainly researched in the context of Integrated Water Resource Management (IWRM) at the sub-national level (e.g. river basin) (e.g. Huntjens *et al.*, 2011). Learning in national policy processes is rarely considered; however the context is substantially different than at sub-national and river basin level because of the involvement of different policy actors, such as elected officials in parliament. National policy actors work at a different scale of intervention and may respond to different demands and constraints.

Scotland offers a good empirical case for the examination of national policy processes, and the role of various factors such as crisis, European Directives, advisory groups, and devolution of parliamentary powers (see Introduction). Both the processes of greater participatory governance and devolution may have changed the way stakeholders and elected officials influence Scottish flood policy. Drawing on research on the policy process, the concept of policy learning, and its relationship with policy change, is used to explore policy change on flood management in Scotland, from the 1950s to the 2000s. Theories on policy learning and change are first briefly reviewed, and the research design is outlined. This is followed by an inductive analysis of the processes underpinning the formulation of catchment flood management and rural land management, as two central dimensions of integrated flood and rural land management. The discussion focuses on the effects of five dimensions on policy learning and change: the impact of events; the role of policy actors and coalitions; the distribution of resources; the impact of policy venues; and, the impact of devolution. Implications of these findings for adaptive governance are drawn.

2.2. THEORETICAL CONTEXT

The concept of policy learning reflects the idea that policies may be modified based on new knowledge and the assessment of the performance of previous policies, as opposed to solely through the influence of power, interest and coalition alignments (Bennett and Howlett, 1992; Parson and Clark, 1995). Policy learning may be characterised by who learns, what is learned, and with what impacts (Bennett and Howlett, 1992). With regards to who learns, early work on policy learning focused on policy actors working in government such as civil servants and elected officials (Parson and Clark, 1995). From a governance perspective, policy learning must also be explored within the broader policy community and society at large (Hall, 1993; Diduck, 2010). Relevant policy actors may therefore include not only civil servants and elected officials, but also interest groups, stakeholders and the general public.

With regards to what is learned, policy learning may focus on the substance of policies, for example on the performance of existing policy programs or the degree of fit between the policy problem and existing policy; alternatively, it may focus on procedural dimensions, for example on the performance of administrative procedures, or, more strategically, on different ways to influence decision-making (Dovers and Hezri, 2010). The impact of learning on policy change may consequently vary. It may result in improved design and implementation of policy programs. Policy learning may modify policy objectives based on a different understanding of the problems to be tackled by policy, and their adequate solutions. Finally, policy learning may result in re-designing decision-making processes or in changes in the strategies taken by policy actors to influence the policy process.

The relationship between policy learning and change is not straightforward and has triggered long-standing debate, in part because of disagreement on the relative role of power and ideas in policy change (John, 1998; Hay, 2002). Traditional accounts of policy change focused on interest-based politics and have tended to ignore altogether the influence of technical and scientific knowledge on policy actors beliefs, values and interests (Parson and Clark, 1995). Learning itself is embedded in power relationships and therefore is not independent from other intervening variables (e.g. interest based politics). Constructivists (Fisher and Forester, 1993; Hajer and Wagenaar, 1995) would for example dispute that a convergence of views is an indication of collective learning and would conceptualise it as a discursive strategy to gain power in the policy process, making it difficult to measure “true” from “false” learning. Béland (2010) identifies three ways in which ideas influence the policy process. First, ideas influence how problems of public concern are portrayed in society, and therefore what issues are matters worthy of attention for public policy. Second, ideas legitimise or challenge different policies by influencing the ways in which policies are evaluated by policy actors. Paradigms such as IWRM are an exemplar of how policies and practices are evaluated through dominant ideas (Molle, 2008). Third, ideas such as cultural symbols and representations can be actively used by policy actors to appeal to dominant values and beliefs in society and build support

for specific policy options. These propositions illustrate how ideas can both maintain policy stability and induce change: policy actors may be bounded by dominant paradigms, but they can actively use alternative ideas to influence the policy process.

The work of Huitema and Meijerink (2010) is useful to identify the different ways ideas and interests may intertwine in the formulation of new policies. Four strategies of policy actors to influence the policy process are identified: the development of ideas, the building of coalitions, the exploitation of venues, and windows of opportunity. They are discussed in turn. When developing ideas, policy actors justify their policy positions and try to convince other policy actors. Much time and resources are invested in pilot projects, scientific reviews and policy evaluations (Sabatier, 1988). This may be to increase the evidence base of policy-making and understand the implications of new scientific knowledge (Sanderson, 2002). For example, the current research programme on flood policies in England and Wales piloted by the UK government has funded several independent policy evaluations and scientific reviews (Everard *et al.*, 2009). In other situations, this is to redefine problems of public concern in ways that support their favourite policy positions. For example, Lebel *et al.* (2011) describe how competing stories were developed in Thailand to justify different solutions to the flooding problem along the Mekong. It is worth noting that the development of ideas may also be inhibited. Policy proposals implied by the learning process may conflict with the interests of powerful policy actors, for example when new policy options require new expenditures or result in disproportionate impacts on one group in society. Learning about these policy options may therefore be resisted and resources targeted towards other options. Brody *et al.* (2009) have for example shown that local governments in the U.S. tend to pursue policy learning towards less expensive and politically sensitive interventions.

Policy actors may work together through coalitions of shared belief, values or resources (Huitema and Meijerink, 2010). They may collaborate strategically, for example when a local organisation cooperates with a national one to increase their influence at the national level (Lebel *et al.*, 2011). In the Advocacy Coalition

Framework of policy change, Sabatier (1988; 2009) holds that most policy changes arise from shifts in the influence of opposing policy coalitions. He posits that learning is usually targeted at issues peripheral to coalitions rather than core policy principles, and occurs within very specific circumstances. In particular, learning is most likely to be pursued when conflict between policy coalitions is sufficiently intense to generate resources for learning, yet not so intense as to prevent exchange. Under these circumstances, exchange can be mediated through an apolitical forum where professional norms ensure scientific debate dominates, resulting in a convergence of views over time.

The role of coalitions in influencing policy change has received some attention in past research on flood policy change (Johnson *et al.*, 2005; Meijerink, 2005; Huitema and Meijerink, 2010). Distinct periods (e.g. from building flood defences to flood risk management) are associated with the influence of specific policy actors and coalitions over flood policy. They disagree, however, on the degree to which policy actors can be grouped into coalitions. Johnson *et al.* (2005) suggest that policy change is more the result of individual policy actors championing ideas in an already receptive policy community, Meijerink (2005) identify clearly opposing coalitions based on different ideas about flooding and flood management, and Huitema and Meijerink (2010) argue that individual policy actors use various tactics including coalition building to influence policy.

In Huitema and Meijerink (2010) work, policy actors can exploit “venues”, i.e. platforms where policy ideas can be debated and developed, such as advisory groups, committees or public hearings. To do so, policy actors may set venues up or close them, influence what ideas are allowed to be discussed, decide on who participates and who has greater authority, and limit available resources. Lebel *et al.* (2011) for example observe that public authorities in Thailand maintained control of flood policy by isolating the policy process from civil society (e.g. maintaining it as a bureaucratic procedure internal to government) or by setting up deliberative arenas with limited power on the decision-making process. Pahl-Wostl *et al.* (2010) suggest that policy learning is limited in venues set up by government because debates are targeted towards the governmental agenda. With

flexible membership and remit, and non-binding outcomes, informal venues are more conducive to open debates. However, for Pahl-Wostl *et al.* (2010), informal venues may be less likely to influence policy. For Meijerink and Huitema, 2010), policy actors participate, or not, in different fora in order to exploit their influence on the policy process, or dispute their authority. This would suggest that policy actors with good expertise on a topic may participate in technical policy venues (e.g. advisory group) where their expertise is recognised and particularly valued, while more politically influential policy actors may make the most of political venues (e.g. Parliament).

Finally, particular events or crises may raise public awareness of a problem of public concern; policy actors may exploit such “windows of opportunities” to justify policy change, build political support towards their preferred options, and increase the rate of policy change (Birkland, 2006; Huitema and Meijerink, 2010). Johnson *et al.* (2005) illustrated how major floods in England and Wales have historically accelerated the rate at which new knowledge available in the policy community resulted in policy change. Huitema and Meijerink (2010) identified several types of windows of opportunities for water policy change, including floods, environmental crisis and national elections.

The above discussion has characterised how the formulation of new policies may be influenced by policy actors, coalitions, policy venues and windows of opportunities. Policy learning enriches theories based on interests and power by providing a conceptual lens to explore the role of ideas, knowledge and information in the policy process (Bennett and Howlett, 1992). The next section presents the research approach for examining policy learning and change in Scottish national flood policy.

2.3. RESEARCH DESIGN

Factors influencing policy learning and change were explored in the context of the formulation of catchment flood management and rural land management in

Scottish flood policy. The period selected is between 1947, when the first post-second world war expert-group on flooding was set up, and 2009, when the 2009 Act was enacted.

Finding empirical evidence that unambiguously demonstrates that policy change arises from policy learning rather than the influence of particular policy actors is difficult (Bennett and Howlett, 1992). Counterfactuals rarely exist in historical research and the social sciences more generally. Researching the link between policy learning and change requires detailed and comprehensive analysis of the policy process to understand the basis for taking particular decisions, through for example the analysis of available archives and testimonies from key policy actors (Bennett and Howlett, 1992). Evidence in this Chapter was collected through documentary analysis and interviewing. Data collection and analysis are discussed in this section.

2.3.1. Data Collection: Documents

Documentary analysis is a text-based analytical process to understand the substantive content, internal arguments, style or coverage of documents; it is particularly useful when direct observation or questioning cannot reconstruct the history of events and experiences (Ritchie and Lewis, 2003). 69 documents were examined (Appendix A). Documents were retrieved by exploring web-sites of organisations involved in flood policy, and recognised archives including the UK and Scottish National Archives, Hansard and the Official Report. Where possible, this was cross checked during interviews. The following documents were examined:

- Official government publications (e.g. laws, policies, strategies, plans and guidance) were used to identify policy objectives and programmes.
- Internal administrative documents, transcripts of Parliamentary debates, governmental publications, minutes of meetings and publications from

stakeholders were used to reconstruct relative concerns and objectives of policy actors around certain events.

- Academic publications (e.g. master theses, PhDs, journal articles) were used to provide further evidence on certain dimensions of the analysis.

Four checks are suggested by Burnham *et al.* (2008) to minimise bias and misinterpretation of documentary evidence: authenticity, credibility, representativeness and meaning. Table 2.1 presents an assessment of the sources used in the context of the thesis. Checks were carried out as follows:

- Authenticity (i.e. the degree of certainty in authorship) was not an issue because documents were retrieved from established sources.
- Credibility (i.e. the degree of distortion in reporting) was not a major issue because documents retrieved were used to examine how policy actors portrayed certain events, and their portrayals were compared to each other in order to understand relative issues and objectives.
- The question of representativeness (i.e. the degree to which an event is covered from all angles) mostly arises around whether available documents are representative of all original documents and viewpoints. This represented a challenge since the aim of the research was partly to recreate policy debates back in the 1950s, and evidence becomes sparser with time. Systematic retrieval from the sources listed above helped recover documents from at least two different sources for each period to cross-check outcomes.
- Issues with meaning (i.e. the degree to which interpretation of a document is sensitive to the vocabulary used and the context it was produced in) can mainly arise from misinterpreting terminology used, not appreciating the cultural and social context of the document, and the conditions under which a document was provided (e.g. the authors' intentions). These issues were minimised by systematically analysing all available pieces of evidence, and cross checking information arising from different sources and policy actors.

Table 2.1 - Assessing the quality of documents

Documents	Analytical purpose	Authenticity	Credibility	Representativeness	Meaning	Analytical risk for research purpose and action taken
Government publications (e.g. laws, policies, strategies, plans and guidance).	To identify policy objectives and programmes.	Official sources (UK and Scottish Parliament website, UK and Scottish Government website, UK and Scottish National Archive, responsible authorities website).	Official public publications.	Systematic recording of laws and policies (UK and Scottish National Archives). Weaker for earlier recordings.	Political documents with multiple meanings. Terminology and context becomes more complex to understand with time.	Some risk as it is a key source of information: systematic comparison between documents and sources to reduce risks.
Transcripts of Parliamentary debates.	To reconstruct relative concerns and objectives of policy actors around certain events.	Official sources (Hansard, Official Report).	Systematic procedures of verbatim transcription.	Systematic procedures of verbatim transcription.	Political documents with multiple meanings. Recognised procedures of verbatim transcription. Vocabulary and context becomes more complex to understand with time.	High risk as it is an important source of information: systematic comparison between documents and sources to reduce risks.
Publications from stakeholders	To reconstruct relative concerns and objectives of policy actors around certain events.	Official sources (stakeholder website, UK and Scottish Parliament website, UK and Scottish Government website).	Official public publications for lobbying.	Missing publications from important stakeholders at the time can lead to over-emphasis on those available.	Political documents with multiple meanings. Terminology and context becomes more complex to understand with time.	High exposure as it is an important source of information: systematic comparison between documents and sources to reduce risks.

Documents	Analytical purpose	Authenticity	Credibility	Representativeness	Meaning	Analytical risk for research purpose and action taken
Internal administrative documents.	To reconstruct internal concerns and objectives of policy actors around certain events.	Sourced from government department archives, recognised sources (Scottish National Archives), and from interviewees where available.	Official internal publications.	Systematic recording of laws and policies (UK and Scottish National Archives). Weaker for earlier recordings.	Terminology and context becomes more complex to understand with time.	Some risk as it is an important source of information: systematic comparison between documents and sources to reduce risks.
Published academic publications.	To provide further evidence on certain dimensions of the analysis but also suggested avenues for further research.	Official sources (academic journals)	Academic procedures of research	Sensitive to data collection from author	Interpretation of author can be misleading.	Low risk: systematic comparison between documents and sources to reduce risks.
Minutes of meetings.	To inform the general issues of concerns at time of meeting.	Official sources (Scottish Government website).	Can be distorted because may only report fragments of discussions and conclusions of meetings.	Can be distorted because may only report fragments of discussions and conclusions of meetings.	Can be distorted because public minutes may be politically sensitive.	Low risk as minimum source of information: systematic comparison between documents and sources to reduce risks.

Research findings on older events are more likely to suffer from these issues than later ones. Data for events between the 1940s and the 1980s mostly originate from Parliamentary debates and governmental publications. Documents from more sources (e.g. non-governmental actors) were used for events in the 1990s and 2000s. Documentary accounts during this time period were cross-checked with direct observation through in-depth interviewing, which improve the completeness of the historical record and the reliability of the analysis.

2.3.2. Data Collection: Interviews

Interviews generate an in-depth understanding of social actors' personal experience, opinions, beliefs and attitudes in the research context (Ritchie and Lewis, 2003). They are particularly useful to explore rich, complex past processes because they offer an opportunity for depth of focus and clarification amongst social actors. Interviewing is therefore well suited to generating an understanding of how social actors perceive, adhere to, challenge, exploit, and modify social structures. Four issues must be taken into account for in-depth interviewing: who to interview, what to ask, how to carry out interviews, and how to analyse results (Burnham *et al.*, 2008).

In total, 16 in-depth, open-ended interviews were conducted with national policy actors (Table 2.2; Appendix B). The research took mainly a purposive, snowballing approach. Purposive sampling is appropriate when the study aims to focus on particularly relevant potential respondents, for example influential leaders; snowballing technique is appropriate when potential relevant respondents are difficult to identify (Babbie, 2008, p. 204). In this research, the most relevant respondents were policy actors influential for integrated flood and rural land management in Scotland. Policy actors working on flood policy from each relevant national governmental and non governmental organisation were first selected and contacted. As the research progressed, other policy actors were selected based on their perceived influence on the policy process arising from the analysis of documents and previous interviews. The interviews cover several

policy actors closely involved in the development of Scottish national policies over the last 10 to 20 years, including civil servants and elected officials in central government, the association of local authorities (Convention of Scottish Local Authorities), the main environmental regulators (Scottish Environment Protection Agency –SEPA and Scottish Natural Heritage –SNH), two environmental NGOs (Royal Society for the Protection of Birds -RSPB, WWF-Scotland), one rural business association (National Farmers Union Scotland –NFUS), and academics. Several respondents were selected in the Scottish Government, SEPA and Scottish Parliament because of their influence on past flood policy change or their expertise in specific policy issues.

Table 2.2 - Name of organisations and number of representatives interviewed

Organisation	Number of representatives interviewed
Scottish Government	4
Scottish Environment Protection Agency (SEPA)	3
Members of the Scottish Parliament (MSP)	2
Academics	2
Scottish Natural Heritage (SNH)	1
Royal Society for the Protection of Birds (RSPB)	1
WWF-Scotland	1
National Farmers Union Scotland (NFUS)	1
Convention of Scottish Local Authorities (CoSLA)	1
Total	16

Interviews were carried out between May 2009 and October 2010, and lasted on average one hour. Interviews were semi-structured. Templates were informed by theories on policy learning and change and the empirical context, but also on theoretical themes identified in Chapter 3 (see Theoretical Context) which extends the analysis to policy integration in national policies. Topics explored in each interview included 1) their professional background, 2) their involvement in flood policy and 3) their views on changes in flood policy and other policy actors (Table 2.3). Interviews had no rigid framework following a typical qualitative, open-ended interviewing technique (Ritchie and Lewis, 2003). Common themes were explored between sets of interviews but new themes were allowed to complement

subsequent interviews. While the core focus remained coherent across interviews, questions were added to the interview template where additional information was sought on particular events.

Table 2.3 - Interview template for national policy actors

Background of interviewee

Could you tell me about your current role in the organisation? Could you tell me about your past and current involvement in flood policy? And on catchment flood management and rural land management?

Past involvement in flood policy

Did you feed into the development of flood policy, and if yes, why and how? What were the priorities of your organisation? Who did you work with, and how did you work with them? Did you face opposition from other stakeholders? Is your experience of national flood advisory groups more positive or negative, and why?

+ *Specific questions relevant to different interviewees as they arose during the interview and analysis*

Implementation of 2009 Act

Is your organisation involved in implementation, and if yes, why and how? What are your priorities? What are the strengths and weaknesses of the 2009 Act with regards to catchment flood management? And rural land management? Are there synergies with other policies? Why and how? Are there conflicts with other policies? Why and how?

+ *Specific questions relevant to different interviewees as they arose during the interview and analysis*

There are diverse views with regards to the nature of knowledge produced by interviewing and the neutrality of the researcher (Foddy, 1993; Ritchie and Lewis, 2003). Interviewing may for example distort, modify, and possibly create the interviewee's perception of the real world. A balanced approach was strived for between a pro-active and neutral role where the interviewer is a facilitator to generate thoughts, feelings and views, and encourages interviewees to reflect on those. Standards of good practice were followed (Ritchie and Lewis, 2003), for example being flexible, establishing a good rapport, allowing time to reply, using a mix of broad and narrow questions, avoiding leading questions, and asking clear questions.

2.3.3. Data Analysis

The analytical process combined two established analytical approaches: process-tracing and thematic analysis. Process tracing is a form of historical analysis used to explore causal links over long periods in a structured approach (George and Bennett, 2005). Two forms of process-tracing exist: one that uses theories with empirical investigation of historical observations to identify and test potential explanations and causal paths; the other develops theoretical explanations based on empirical observations, and tests them in other contexts. The first approach was taken, and complemented with thematic analysis. Thematic analysis classifies data into distinct dimensions and categories, and explores their linkages (Ritchie and Lewis, 2003). It was used to help categorise information grounded in documents and transcripts into themes comparable with theories on policy learning and change. The analysis was as follows.

Interviews were recorded and fully transcribed. Documents and interviews were imported into NVIVO8 which assisted the analytical process. NVIVO8 is a research software supporting the coding, categorisation and retrieval of textual information (see e.g. Bazeley, 2007). Such a program eases data management by means of a rapid code, search and retrieve function, and can help with more sophisticated analysis such as linking concepts, developing causal explanation and building theory. Qualitative research softwares can however also be a disadvantage because they can discourage the researcher from considering the context of coded segments and can divert attention away from rigorous analysis of the original data (Ritchie and Lewis, 2003). In this thesis, the program was simply used to improve the rigour and consistency of the categorisation and to help ease data management.

Using NVIVO8, thematic categories were developed from the examination of documents and interviews, in an inductive way in order to allow the emergence of themes by sorting, labelling and synthesising information. Codes were first developed close to the substantive meaning of data (e.g. paraphrasing). They were then associated with more abstract categories consistent across the data in order to

have a common, cross-sectional categorisation (Ritchie and Lewis, 2003). The selection of categories was also informed by their potential relevance to the theoretical context selected for the research (i.e. policy learning and change) (Ritchie and Lewis, 2003). The analysis focused on exploring policy learning and change relevant to integrated flood and rural land management.

Coding led to the creation of 1,686 codes paraphrasing the substantive meaning of the documentary or interview evidence. Each code was then associated with 35 first-level categories, themselves associated with five second-level categories (Figure 2.1). Sometimes one code could be associated with several first-level categories if relevant to those categories. For example, if the code was “environmental NGOs used pilot projects to influence Members of the Scottish Parliament during the 2009 Act”, it was categorised under “environmental NGOs” and “2009 legislative process”.

Codes for each of the 35 first-level categories were retrieved onto word documents. Patterns of agreements and disagreements between codes were explored to test the nature and strength of 1) the internal dimensions of each category, and 2) relationships with other first-level categories. The result was to provide, for each first-level category, an understanding of its main characteristics and how they fitted with other categories. Summaries were developed for each first-level category and linked together chronologically to result in a detailed historical narrative spanning the period under analysis (1940s-2000s). This process proved to be time-consuming and complex because it required retrieving the raw data for each code in order to work with the original information rather than only with codes themselves.

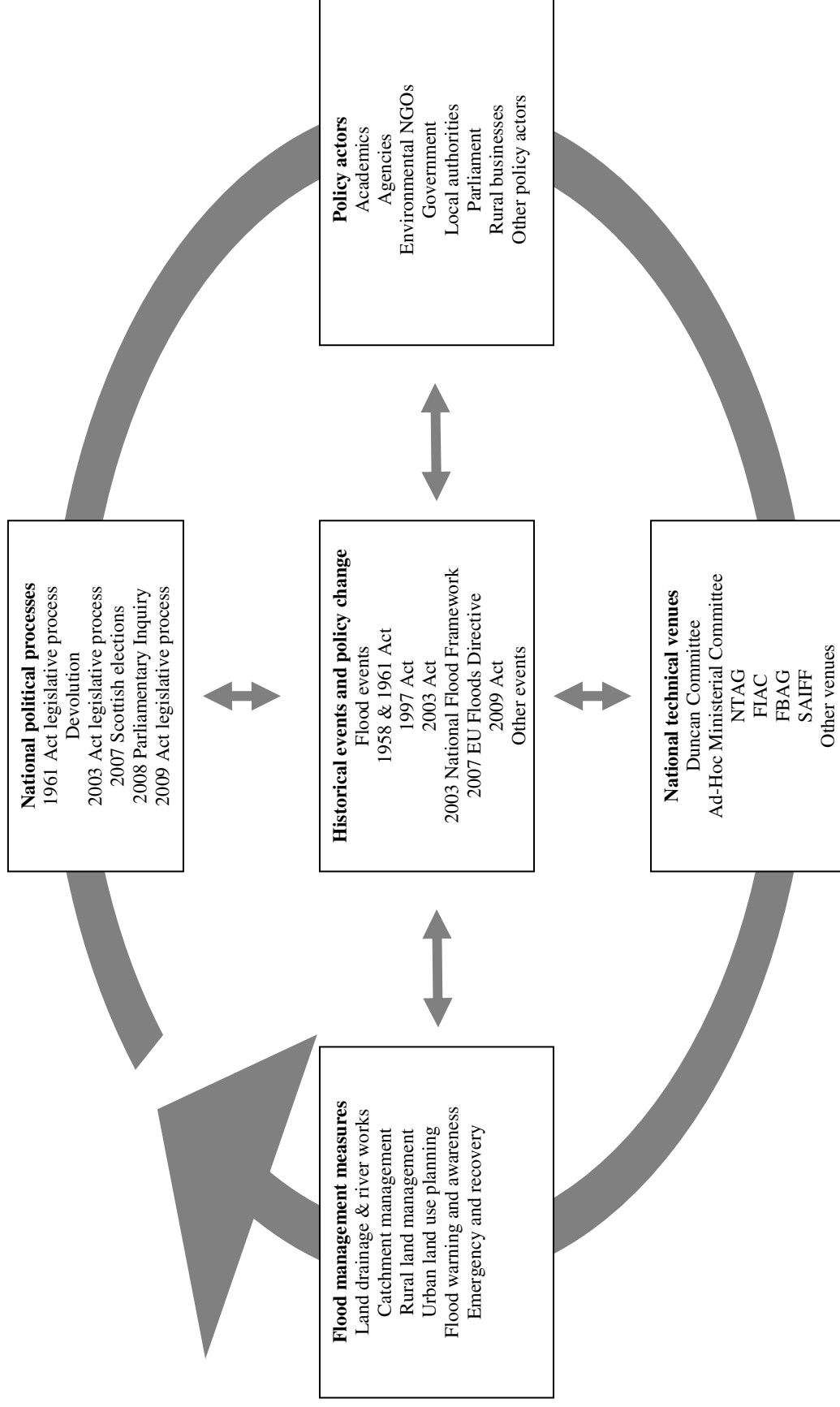


Figure 2.1 - Categorisation of concepts arising from the analysis of interviews and documents, comprising five second-level categories and 35 first-level categories within these

Fourth, the rich detailed and contextual information provided by the historical narrative was compared with theoretical perspectives on policy learning and change, in order to test the relevance, fit and broader applicability of the results (Ritchie and Lewis, 2003; George and Bennett, 2005). Because second-level categories were informed by theories of policy learning and change, they helped draw conceptual links between the historical narrative and theory.

The next section presents the results as an historical narrative retracing the formulation of catchment flood planning and rural land management in Scottish flood policy from 1947 to 2009. Documentary and interview data are therefore blended into the historical narrative. The discussion presents the outcome of the comparison between the historical narrative and theories on policy learning and change.

2.4. RESULTS

Three periods in the Scottish approach to flood management were identified between 1947 and 2009 (Table 2.4). In the first period, between 1947 and 1992, emphasis was placed on agricultural land drainage and, to a lesser extent, urban flood prevention. Priority in the second period, between 1992 and 2003, was given to urban flood prevention, with some policy changes in urban development control and flood warning. In the third period, between 2003 and 2009, additional approaches were considered, such as emergency support and rural land management techniques. The next three sub-sections describe these phases in more detail.

2.4.1. Rural Land Drainage and Flood Prevention (1947-1992)

After the Second World War, increasing agricultural and forestry productivity became governmental priorities in the UK, and led to extensive land drainage across Scotland (Robinson *et al.*, 1990). In parallel, post-war growth of urban

areas in floodplains resulted in greater demand for protection against flooding (Werritty, 2006). The Land Drainage (Scotland) Act 1958 (the 1958 Act) and Flood Prevention (Scotland) Act 1961 (the 1961 Act) were enacted to encourage public and private investments to protect respectively agricultural land and urban areas. The start of the development of both Acts can be traced back to the Duncan Committee set up in 1947 by the Scottish Office, i.e. the department of the UK department responsible for several governmental functions in Scotland. In all documents retrieved, the Duncan Committee is revealed to be the first national venue to discuss flooding issues in Scotland post Second-World War.

The Duncan Committee's main objective was to identify ways to improve the legal and policy framework to facilitate the drainage of agricultural land to increase food production (HC, 1950). The Committee consisted of agricultural engineers and received evidence from organisations and individuals whose interests were the protection of their land⁸ or whose expertise was mainly in land improvement⁹. The final report of the Duncan Committee recommended grant-in-aid support to drainage projects reducing flooding on private agricultural land, but also to more comprehensive drainage projects reducing flooding on both rural and urban land (HC, 1950). The stated aim was to reduce the impact of increased drainage on downstream flooding and to achieve economies of scale by encouraging joint investment between the Scottish Office, landowners and local authorities.

⁸ They included: private landowners, the Convention of Royal Burghs, the Association of County Councils, the National Farmers Union of Scotland, the Scottish Land and Property Federation.

⁹ They included: Royal Institution of Chartered Surveyors and the Department of Agriculture for Scotland.

Table 2.4 - Events, laws, policies, political venues related to flood management in Scotland from the 1940s to the 2000s

Time	Event	Comments
First Period: Land drainage and flood prevention		
1947-1950	Duncan Committee.	Policy venue, recommends the improvement of the administration of land drainage.
1948	Borders floods.	Flood event.
1950s	Local authorities become responsible for development control in floodplains.	Policy.
1956	Moray floods.	Flood event.
1957-1958	Parliamentary process for Land Drainage (Scotland) Act 1958.	Political venue; law, sets statutory powers to enable public investment in land drainage works.
1960-1961	Parliamentary process for Flood Prevention (Scotland) Act 1961.	Political venue; law, sets statutory powers to enable public investment in flood prevention works.
1961	Agreement between UK government and insurance companies on the provision of flood cover.	Policy.
1970	Moray floods.	Flood event.
1970	Agriculture Act 1970.	Law, improves administrative procedures for flood warning schemes.
Second period: Flood prevention and the emergence of flood risk management		
1989	East Highland floods.	Flood event.
1992	Changes in funding rules for FPS.	Policy.
1993	Tay/Earn floods.	Flood event.
1994	Strathclyde floods.	Flood event.
1994-1995	Parliamentary process for Environment Act 1995	Political venue; law, creates the SEPA.
1995	National Planning Policy Guideline 7.	Policy, encourages better coordination at local level between local and water authorities in urban drainage.
1996-1997	Parliamentary process for Town and Country Planning (Scotland) Act 1997.	Political venue; law, encourages better consideration of flood risk in planning decisions.
1996-1997	Parliamentary process for Flood Prevention and Land Drainage (Scotland) Act 1997.	Political venue; law, places statutory duty on local authorities for urban watercourse assessments and maintenance.
1997	Devolution.	Set up of a Scottish Parliament.
2001	Launch of flood warning service and Flood Awareness campaigns.	Policy, better arrangements for flood warning and awareness programmes.
Third period: Flood risk management		
2002	Glasgow floods.	Flood event.

Time	Event	Comments
2002-2003	Ad-Hoc Ministerial Committee on flooding.	Political venue.
2002-2003	Parliamentary process for Water Environment Services (Scotland) Act 2003.	Political venue; law, transposes the EU WFD, and places a duty to promote SFM.
2003	National Flooding Framework.	Policy, sets an integrated approach to flood management between flood alleviation, flood awareness, emergency services, and spatial planning.
2003-2004	National Technical Advisory Committee.	Policy venue
2004	Spatial Planning Policy Guidelines.	Policy, strengthens development control on a risk approach.
2004	Civil Contingency Act 2004.	Law, aims to improve emergency services to natural and technological hazards.
2005-2007	Flooding Issues Advisory Committee.	Policy venue.
2007-2008	Evidence taking by Rural Affairs and Environment Committee of the Scottish Parliament.	Political venue.
2008	Consultation by Scottish Government.	Policy venue.
2008-2009	Flooding Bill Advisory Group.	Policy venue.
2008-2009	Parliamentary process for Flood Risk Management (Scotland) Act 2009.	Law, transposes the EU Floods Directive.
2009-onwards	Scottish Advisory and Implementation Flood Forum.	Policy venue.

Recommendations of the Duncan Committee for joint investment between private and public interests faced much opposition, reflected in debates during the legislative process for the 1961 Act. Local authorities wanted riparian landowners to contribute, in-kind or financially, to the maintenance of rivers and the prevention of flooding on the basis that riparian duties under Common Law required such maintenance (see also, SCOTS, 2008). Riparian landowners were opposed to the idea, and the Scottish Office justified the development of separate statutes under the 1958 and 1961 Acts on the basis that:

“There has been failure to the property owner, the local authority, statutory boards and so on to agree to what should be done and how they should apportion the cost” (Hansard, 1960, column 97).

During the legislative processes for the 1958 and 1961, there was consensus amongst Scottish Members of the UK Parliament (Scottish MPs) Acts that more land drainage and flood prevention rather than less was necessary. The 1958 Act empowered groups of landowners to apply for approval and financial support to carry out large-scale drainage works on agricultural land. The 1961 Act was developed to complement the 1958 Act by covering the needs of urban areas and gave discretionary powers to local councils to carry out flood defences on non-agricultural land. All works other than maintenance and management operations were to be approved by the Scottish Office through Flood Prevention Schemes (FPS) outlining the works to be carried out. The policy framework under both Acts was permissive and relied on the voluntarism of landowners and local authorities.

Investment by landowners and the Scottish Office towards agricultural land drainage were at their peak in the late 1940s and the 1970s until mid 1980s (Figure 2.2), driven by favourable agricultural market conditions and incentives from government grants, a situation that changed in the mid-1980s with agricultural depression and phasing out of grants for drainage under changing European agricultural policy (Robinson *et al.*, 1990). In contrast, few FPS were funded between 1961 and the early 1990s compared to the marked increase in the late 1990s (Figure 2.3). FPS mostly enabled the construction of flood defences (e.g. flood walls, embankments, channel improvement, etc); storage areas such as

playing fields, loch and washlands were rarely used until the 1990s (Appendix C). No FPS included wetland restoration or agricultural land management as a measure. By the early years of the 1990s, agricultural land drainage investment had largely disappeared while urban flood prevention was about to gain in significance.

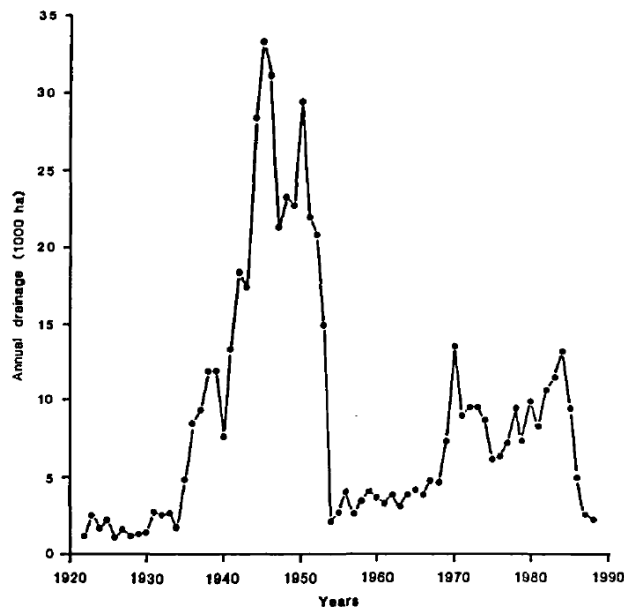


Figure 2.2 - Annual area drained in Scotland 1922-1988
(Source: Robinson *et al.*, 1990)

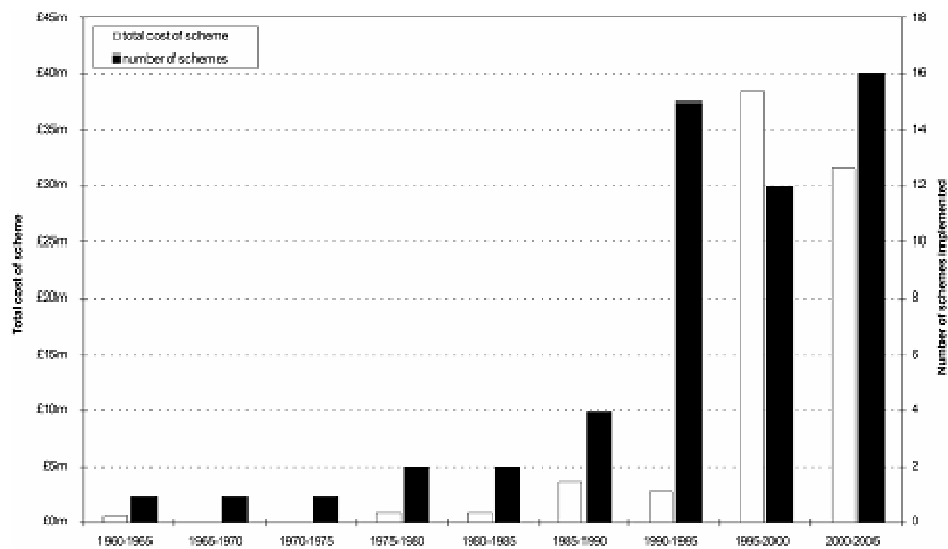


Figure 2.3 - Number of works funded through the Flood Prevention (Scotland) 1961 Act between 1961 and 2007 (Source JBA, 2005. Costs actualised to 2004 prices)

Overall, the first phase in Scottish approach to flood management was dominated by separate policy frameworks for rural and urban flood alleviation. The Duncan Committee attempted to draw lessons from existing practices, and recommended a combined approach. However, the Committee was primarily driven by rural drainage interests, and subsequent policy negotiations failed to create a common legislative basis. Urban flood alleviation did not appear to be a priority investment until the 1990s, and no evidence of policy review or change could be found until then.

2.4.2. Flood Prevention and the Start of Flood Risk Management (1992-2003)

Major flooding in the East Highlands (1989), Perth (1993) and Strathclyde (1994) raised public and political awareness of urban flood risk across Scotland (Werritty, 2006). The Strathclyde floods in particular were characterised by several occurrences of overflow from urban drainage systems (pluvial flooding). The Scottish Office engaged in several activities leading to changes in 1) the financial arrangements for FPS in 1992, 2) the enactment of the Flood Prevention and Land Drainage (Scotland) Act 1997 (the 1997 Act), and 3) new arrangements on urban planning control and urban drainage. They are examined in turn.

In 1992, the Scottish Office decided to change the three tier system of aid for FPS to local authorities¹⁰ set up after the enactment of the 1961 Act, into a flat rate of 50%. The belief was that, by streamlining the administration of the grant schemes and removing the uncertainty of the final rate of contribution, local authorities would become more willing to invest in flood management (SO, 1992). Several interviewees, including one Member of the Scottish Parliament (MSP) (previously a local authority elected official), and representatives from the Scottish Government and local authorities, stressed that encouraging local authorities' to

¹⁰ FPS could be funded at different rates depending on past flood defence works carried out by the local authority, the costs of the proposed FPS and the financial capacity of the local authority. Rates were set at 25, 50 and 75%.

invest in flood alleviation has been, and is, a challenge. Flood defences are expensive activities which may receive less attention than core policy programs:

“Flood planners had to compete within the local authority against the Director of Education, or the Director of Social Work and flooding would always be given lower priority than those issues” (MSP 1, 09/09/2010).

Greater investment in the late 1990s and early 2000s (Figure 2.3) suggests that administrative change achieved its policy objectives. Several floods in that period may also have increase political awareness, and willingness, to invest in flood management. For example, the high investment level in the period 1995-2000s (Figure 2.3) is dominated by one FPS in Perthshire, initiated by the local authority after major flooding in their local area (JBA, 2007). Overall, Figure 2.3 suggests that the 1990s represented an intensification of existing practices on flood prevention.

The 1997 Act amended the 1961 Act by placing statutory duties on local authorities to assess and maintain watercourses likely to cause urban flooding, as opposed to the existing permissive, discretionary provisions. A Scottish Government interviewee then working for the Scottish Office suggested the 1997 Act was specifically designed as:

“The response to the perception that the Strathclyde 1994 floods was the result of insufficient channel maintenance” (Scottish Government 2, 21/04/2011).

Examining parliamentary debates for the 1997 Act shows that the Act clearly did not tackle some of the issues raised by Scottish MPs. These issues include: 1) the lack of financial contribution by the Scottish Office and landowners to river maintenance and delivery of FPS, 2) the lack of a catchment wide approach that would take into account the impact of flood defences and land drainage on flood risk, and 3) the environmental impact of flood defences. The environmental impact of flood management represented a new topic of debate compared to the 1961 Act, and Scottish MPs made reference to evidence provided by the environmental regulator, SEPA and the environmental NGO WWF-Scotland. The following quote illustrates how one Scottish MP called for soft-engineering flood management:

“Increasingly— according to the World Wide Fund for Nature— Scotland's rivers are suffering incremental damage from these activities. Flood defences often unnecessarily straitjacket rivers, fill in wetlands or remove islands, damaging rivers and their own ability to absorb flood impact. The so-called soft engineering techniques can provide long-term flood alleviation, while at the same time enhancing the natural heritage” (Hansard, 1997, column 381).

In Parliamentary debates, the Scottish Office did not support catchment flood management and environmentally-friendly techniques. With regards to catchment flood management, a Scottish Government interviewee working then for the Scottish Office explained that the Scottish Office prioritised the improvement of existing activities because of the cost of engaging in new activities:

“There was a lot of financial pressure in the 1990s in implementing the EU Urban Waste Water Directive and the EU Drinking Water Directive. That money was all coming from the same pot within the Scottish Office which means that instead of engaging in new activities in flood management, it was better to improve existing arrangements” (Scottish Government 3, 11/10/2010).

Flood alleviation being the responsibility of 32 different local authorities at that time, no planning framework existed at the catchment level, and no organisation had the capacity to work at catchment level. SEPA was a new organisation, set up through the Environment Act 1995 from regional, water-quality-focused Scottish River Purification Boards. Interviewees repeatedly stressed that the effectiveness of rural land management techniques on flood alleviation had been a long-term, unresolved question, and that local authorities were unwilling to use techniques that did not provide the same level of confidence that other, better understood techniques (such as flood defences) could provide.

Instead, the Scottish Office focused policy improvements on urban development control, urban drainage systems, and the understanding, mapping and warning of flood risk. The National Planning Policy Guideline 7 (SO, 1995) encouraged local authorities to set up Flood Liaison and Advice Groups encouraging cooperation and the sharing of information between local authorities, public agencies and businesses. In legislative debates for the 1997 Act, the Scottish Office argued that Flood Liaison and Advice Groups could help build a voluntary based approach to catchment management. The Town and Country Planning (Scotland) Act 1997

also reinforced a presumption against building on floodplains (Werritty, 2006). In parallel, a working party on Sustainable Urban Drainage Systems (SUDS), including SEPA, water companies, central and local governments, was set up in 1997 to prepare guidance on such techniques, and encourage voluntary adoption of best management practices (McKissock *et al.*, 2003). Against this backdrop of regulatory and voluntary measures, the Scottish Executive, the newly created executive branch of the devolved government of Scotland, funded research into the impacts of climate change on flood risk, improved flood mapping and the development of flood warning schemes. An interviewee from the Scottish Government recalled that funding for these developments became available from England following the 1998 Easter floods:

“We were keyed into the much larger arrangements or capacity of the UK Government. They had x thousand folk working on flooding in the South and we just didn't have that kind of capacity in Scotland. That extra money, something like two million a year, was great because it funded lots of ad-hoc things. We just had that money that no one else was competing for and it was an unusual luxury for us to be able to identify and spend it on what we wanted” (Scottish Government 3, 11/10/2010).

The 1998 Easter floods in England had been the most significant national flood event since the 1953 East Coast floods leading, amongst other impacts, to the loss of five individuals (Johnson *et al.*, 2005). The floods resulted in the release of £23 million a year over three years for flood management in England, focusing in particular on improving flood warning, and, under the formula agreed during the devolution process, 10% of this funding was allocated automatically to the Scottish Executive.

Overall, lower priority was put on catchment flood management and rural land management techniques in the 1990s and early 2000s, and higher priority was put on building flood defences, strengthening of urban development control, encouraging SUDS, and understanding, mapping and warning flood risk.

2.4.3. Flood Risk Management (2003-2009)

The third phase in the Scottish approach to flood management starts with activities following widespread flooding across Scotland in 2002. It finishes with the enactment of the 2009 Act, transposing the EU Floods Directive, repealing the 1961 Act and promoting a sustainable, catchment-based approach to flood management.

2.4.3.1. Co-ordinating Flood Management

In response to the 2002 floods, an Ad-Hoc Ministerial Committee was created in October 2002 composed of civil servants from different teams of the Scottish Executive working on different dimensions of flood management, in particular flood alleviation through FPS, urban planning, and civil contingency. The Ad-Hoc Committee did not interact with non-state actors (Scottish Government 2, 21/04/2010). Participants drew lessons from work of the Environmental Agency in England and Wales (EA) (EA, 1998; 2001), the Learning to Live with Rivers report from the Institute of Civil Engineers (ICE, 2001) and work carried out in parallel to the Ad-Hoc Committee by the Convention of Scottish Local Authorities (CoSLA) (CoSLA, 2003) (Scottish Government 2, 21/04/2010). The CoSLA report recommended establishing a strategic approach to flood management at national level, as well as several amendments to the 1961 Act to ease administrative and financial procedures for FPS (CoSLA, 2003). The Ad-Hoc Ministerial Committee took forward the idea of a national strategy for flood management, and released in February 2003 the National Flood Framework (NFF).

The NFF is structured around the “four As”: Alleviation (e.g. FPS, SUDS), Avoidance (e.g. urban development control), Awareness (e.g. the mapping, forecasting and communication of flood risk), and Assistance (e.g. the provision of emergency and post-disaster support) (SE, 2003). The main policy change of the NFF was the increase in the financial contribution of the Scottish Executive to local authorities’ FPS to a total of £40 million a year (2003 prices) and a rate of

80% subsidy for each FPS (instead of 50%). The £40 million was deemed to protect 1850 properties (SE, 2003), in reality an inadequate target for the scale of flood risk in Scotland, evaluated then at 171,000 properties by Werritty *et al.* (2002). Other measures included in the NFF mostly built on existing active programmes of the Scottish Executive (e.g. simplifying procedures for FPS, strengthening urban planning policy, developing further flood warning schemes, promoting the use of SUDS, improving emergency support) and new areas of work (e.g. increasing insurance uptake, setting up a national advisory group to encourage joint-working).

The NFF did not take forward CoSLA suggestions to amend the 1961 Act with regards to FPS procedures. Several interviewees observed how devolution in 1998 resulted in overloading the legislative process for several years. CoSLA's interviewee for example recalled:

“At the time the legislative programme just didn't allow for legislative change because it was already crowded with other legislations. But the fact that other activities started as a result of the recommendations in the report, that the new advisory group was established, that councils had a representation on those groups were probably the best that we could achieve and, from our perspective, that was a success” (CoSLA, 05/10/2010).

An examination of parliamentary debates during the legislative process for the transposition of the EU WFD, through the Water Environment Water Services Act 2003 (the 2003 Act) which occurred in parallel to the Ad-Hoc Committee reveals however that flooding was a source of concern for many MSPs. An amendment was introduced to put a duty on public authorities to promote SFM, the intention being to encourage a national, co-ordinated and more environmentally-friendly approach to flood management (NTAG, 2003a). Environmental NGOs had been very active in promoting the duty amongst MSPs (Ison and Watson, 2007).

Catchment flood management and rural land management techniques were not included in the policy directions set by the NFF, but the duty for SFM in the 2003 Act led to the creation of a sub-group in the national advisory group set up by the NFF itself. The sub-group was tasked with exploring the meaning and implications of SFM, as presented below.

2.4.3.2. Deliberating Flood Management

The National Technical Advisory Group (NTAG) was set up soon after the release of the NFF in 2003 and re-organised two years later in 2005 into the Flooding Issues Advisory Committee (FIAC) which itself ran for another two years. The main remits of NTAG and FIAC were to take forward the NFF, formulate a definition of SFM, and evaluate its implications for Scottish flood policy (SE, 2003). Members of NTAG and FIAC produced diverse reports consisting of concept papers, research documents, policy evaluations, and experiments (Table 2.5). Most written outputs related to issues of alleviation (in particular FPS and rural land management techniques), awareness, and SFM. The Scottish Executive contracted consultants and academics on various pieces of exploratory work, such as the testing of the SFM definition and indicators (MWH and Jacobs Babbie, 2005), the evaluation of the effectiveness of flood defences (JBA, 2005; 2007), and the social impact of flooding (Werritty *et al.*, 2006). Academics provided unpaid contribution to explore how a catchment approach to flood management could be set up in Scotland (FIAC, 2007). Environmental NGOs and one of the environmental regulators, SNH, also produced reports on rural land management techniques within NTAG and FIAC (NTAG, 2003b; FIAC, 2006) and unilaterally through pilot projects and policy evaluations (WWF, 2002; SEL 2008; WWF, 2007; 2008).

NTAG and FIAC offered a good platform to engage in a national debate on SFM (Werritty, 2006). From being a new and peripheral concept in the early 2000s, SFM became a central one in the final report of FIAC and the 2009 Act (see next sub-section), a process that may be attributed to the successful role of NTAG and FIAC in facilitating the formulation of a broad definition of SFM. The Scottish Government created NTAG partly because it needed to expand the focus of its work and sought support from others to do so:

“The flood team in the Scottish Executive found more and more that they could not deal with flood management on their own and that they were going to have to talk to people in planning, environment, agriculture and others. They ended up with NTAG and it began to have a much broader base” (Scottish Government 2, 21/04/2010).

Many interviewees pointed out that the Scottish Executive had played a key role in facilitating dialogue. One participant for example illustrated the importance of the Scottish Executive official chairing the meetings:

“We had a very eminent and I think a very able civil servant. He was an engineer by background, so he perfectly understood the technical bits but he was very good at opening up discussion and finding ways to keep everybody inside the tent. I thought that was quite skilful chairing” (Academic 1, 06/07/2009).

Table 2.5 - Reports and authorship piloted through NTAG and FIAC

Theme	NTAG (2003-2004)	FIAC (2005-2007)
Alleviation	<ul style="list-style-type: none"> • WWF work on catchment management (Environmental NGOs). • Draft guidance for FPS (Scottish Executive). • Urban drainage design (Scottish Water). 	<ul style="list-style-type: none"> • Prioritisation of FPS (Academics and consultants). • Flood management and multifunctional land use (Local authority). • Rural land use and SFM (SNH and environment NGOs). • Natural flood storage and extreme events (Scottish Executive). • Scottish national inventory of flood defences (Scottish Executive).
Awareness	<ul style="list-style-type: none"> • SEPA hydrometric network (SEPA). • Review of SEPA hydrometric network and flood risk mapping (Academic). 	<ul style="list-style-type: none"> • Flood warning dissemination (SEPA). • Flood Awareness campaigns (SEPA).
Assistance	-	<ul style="list-style-type: none"> • Options for creating a Scottish flood forum.
Cross-cutting	<ul style="list-style-type: none"> • Review of 2003 Act provisions on SFM, and their implementation (Scottish Executive). • Proposed SFM definition (Academic). • Seminar on SFM (SNH). 	<ul style="list-style-type: none"> • What is SFM? (Academic). • SFM Pilot study (Scottish Executive). • Social impact of flooding (Scottish Executive). • Review of council's biannual report (Scottish Executive).

A closer examination, however, shows the limits of the achievements of NTAG and FIAC. The Scottish Executive was largely dependent on the pro-active, voluntary participation of interested policy actors. An examination of membership and attendance levels reveals that core participants were flooding, spatial planning and rural affairs teams of the Scottish Executive, independent experts (i.e. consultants and academics), public agencies (i.e. SEPA, SNH, Scottish Water and English & Wales agencies), local government, and environmental NGOs (Table 2.6). Less so are policy actors such as the water and civil contingency teams of the Scottish Executive, and urban development and agricultural interest-groups.

Table 2.6 - Formal membership of and actual attendance in NTAG and FIAC.
Legend: X: 0-30%, XX: 30-60%, XXX: 60-100% level of attendance based on counts of representatives attending meetings (Source: available minutes of meetings)

Organisations		NTAG		FIAC	
		Membership	Attendance (n=10)	Membership	Attendance (n=21)
Scottish Executive	Flooding Team	Yes	XXX	Yes	XXX
	Water Team			Yes	X
	Spatial Planning Team	Yes	X	Yes	XX
	Rural Affairs Team	Yes	X	Yes	XX
	Civil Contingency Team			Yes	X
Local government	CoSLA	Yes	XX		
	Local authorities			Yes	XXX
Public and semi-public bodies	Scottish Water	Yes	XX	Yes	XX
	SEPA	Yes	XX	Yes	XXX
	SNH	Yes	XX	Yes	XX
	Forestry Commission			Yes	XX
	National Flood Forum			Yes	XX
	England & Wales Agencies	Yes	X	Yes	XX
Interest groups	Insurance	Yes		Yes	X
	Homes for Scotland			Yes	X
	National Farmers Union Scotland			Yes	X
	Scottish Environment Link	Yes	X	Yes	XX
Others	Consultants	Yes	XXX	Yes	XXX
	Academic members	Yes	XXX	Yes	XXX

In parallel, an examination of authorship of reports reveals that most of them were produced individually by participants, and focused on the author's area of interest (Table 2.5). Academics prepared papers on SFM; environmental NGOs on catchment and rural land management; SEPA on flood mapping, warning and awareness. Rather than seeing NTAC and FIAC as a joint learning platform, some interviewees described them as opportunities to influence policies. One of the interviewees from environmental NGOs for example explains how their participation helped them influence national policy:

“A major breakthrough was the set up of NTAG and FIAC and that is to do with the change in attitude within the Scottish Executive. It offered a niche in which we could raise the profile of SFM and identifying our allies in this task” (WWF-Scotland, 17/11/2009).

Local authorities mostly contributed to the work on the guidance to take forward FPS (CoSLA, 2003; NTAG, 2004). Considerable discussions and funding in NTAG and FIAC went into the development of the guidance. One interviewee from the Scottish Government for example recalled the impact of local authorities on the work of the advisory groups:

“I wouldn’t have spent the time writing the guidance. We were getting a lot of criticism for there not being guidance. I think I didn’t know enough at the time when I came in and it was because local authorities wanted it as well so we did feel that we had to do that” (Scottish Government 4, 12/10/2010).

Scientific and policy assessments performed during NTAG and FIAC have not only been limited in terms of their scope, but also in terms of their depth. Interviewees from the Scottish Government (working then for the Scottish Executive) repeatedly reported that they never had the technical and financial capacity of their English counterparts. This is exemplified by the more extensive R&D program which had been established to accompany the UK Government Department for Environment, Food and Rural Affairs’ (DEFRA) delivery of its main policy on water and flooding “Making Space for Water” (DEFRA, 2005), and the development of the catchment flood management plans led by the English/Welsh Environment Agency (EA) (EA, 2004). Research included for example a review of the scientific literature on the effectiveness of rural land management techniques for flood alleviation (O’Connell *et al.*, 2004).

The limitations of NTAG and FIAC can be further demonstrated by the different ways in which stakeholders presented their understanding of SFM during the legislative process for the 2009 Act. For example, in their written evidence for the pre-legislative inquiry, local authorities did not interpret SFM as a balancing approach between different types of measures, but instead as an approach limited to rural land management techniques which did not include other approaches such as flood defences (CoSLA, 2008). Environmental NGOs interpreted it as a balancing act between different flood management measures but prioritizing rural land management techniques because of their environmental benefits (SEL, 2008). Agricultural interest-groups interpreted it as the sustainability of rural livelihoods through drainage and the protection of rural land (NFUS, 2009). An

interviewee from the Scottish Executive described how they actively managed different interests in NTAG and FIAC through membership, chairmanship and authorship in order to reach a balance between participants or exploit their interests:

“We'd be looking at the committee and saying right, you're best placed to go on that sub-committee. You'd ask for volunteers but you'd know beforehand who you wanted on the sub-committees. There were some tactics involved. We gave most chairmanship to individuals other than civil servants to give them ownership so it was seen as a very open approach, that we weren't constraining the deliberations, that they could think about the issues, draft papers and some of them were pet subjects” (Scottish Government 3, 11/10/2010).

The final question provoked by the examination on NTAG and FIAC is how effective was this collective process in effectuating what it was set up to do: informing policy change. Here, one can observe that policy changes during the lifetime of NTAG and FIAC include better arrangements for flood awareness-raising, flood warning and flood risk mapping¹¹ (Spray *et al.*, 2010). However, catchment flood management and rural land management techniques failed to be truly integrated in relevant water and land policies because other issues dominated: e.g. diffuse pollution, barriers to fish passage and channel alterations in water policy; and agricultural modernisation, rural development and biodiversity in the Scottish Rural Development Programme (SRDP) (see Chapter 3).

Several interviewees suggested that NTAG and FIAC did not manage to foster a pro-active participation by agricultural representatives, be it in government or stakeholders, for example:

“The SRDP seemed a very closed shop. It was difficult to touch it because it had taken so much to get the SRDP set up and it was felt it had to be left alone for a wee while. There was a tension between environment and agriculture. We would always be arguing that the SRDP should be looking to address and produce multiple benefits and shouldn't just be about supporting the farmer” (Scottish Government 3, 11/10/2010).

¹¹ Evidence from minutes of meetings in NTAG and FIAC suggests that commitments of the NFF on avoidance and assistance were carried out through another Scottish Executive policy units (i.e. urban and civil contingencies units) leading to Scottish Planning Policy 7 (SE, 2004b), introducing a flood risk approach to urban development control, and the Civil Contingency Act (Scotland) 2004, introducing a resilient approach to emergency and recovery support.

These results would suggest two things. First, the work of NTAG and FIAC mostly influenced policies for which the flood policy team had direct supervision (e.g. flood mapping, warning and awareness). SFM, catchment management and rural land management techniques required cross-policy agreements which turned out to be impossible through NTAG and FIAC. Second, policy change in areas not controlled by the flood policy team only occurred thanks to the political commitments made in the NFF (e.g. urban development control, emergency planning).

The next sub-section will explore how several events at the end of the term of FIAC in 2007 ultimately enabled the build up of political support for policy change, and the institutionalisation of catchment flood management and rural land management techniques in the 2009 Act.

2.4.3.3. The Flood Risk Management (Scotland) Act 2009

Two major events occurred in 2007 which accelerated the pace at which ideas on catchment flood management and rural land management techniques reached political circles. The first event was the Scottish Parliament elections in May 2007 which led to a new governing majority with a commitment to review existing legislation to implement a sustainable approach to flood management (SNP, 2007). The second was the transposition of the EU Floods Directive in December 2007 which put a legal duty on the United Kingdom to develop a catchment approach to flood management. The final FIAC report in September 2007 advised legislative change, taking the opportunity presented by the transposition of the EU Floods Directive (FIAC, 2007). The Scottish Parliament election and the transposition of the EU Floods Directive offered an opportunity to those involved in FIAC to raise political support for legislative change. An academic involved in FIAC for example recalled:

“It got to a point that the 1961 Act was becoming so dysfunctional that the Scottish Parliament would have drafted its own legislation. But that would have taken another two or three years, and when the EU Directive came out, we had to act very quickly” (Academic 1, 06/07/2009).

The EU Floods Directive consolidated the case for catchment flood management. Academics had been charged to explore the ways in which it could be applied in Scotland towards the end of FIAC in view of the future enactment of the EU Floods Directive (FIAC, 2007). They raised two main issues: the appropriate vehicle for a catchment approach and its organisational structure. Academics suggested that flood management could either be integrated into the implementation of the EU WFD or through an independent legislative and policy framework (FIAC, 2007). Academics in FIAC questioned whether flood management should still be the responsibility of several locally based organisations (such as local authorities), or should be transferred to a single agency responsible for flood management across Scotland (such as SEPA), as was partly the case in England and Wales through the EA (FIAC, 2007).

In the 2009 Act, the Scottish Government (formerly known as the Scottish Executive) maintained local authorities as the main delivery organisation, officially on the basis that local authorities had the political legitimacy to account for flooding and had the local knowledge to deliver it (SG, 2008). However, many interviewees suggested that the decision to identify local authorities as responsible authorities was based on a broader policy of the Scottish Government to transfer more powers, and financial responsibility, to the local level. Debates leading to the 2009 Act were indeed dominated by the new commitment, following the elections in 2007, to give greater financial autonomy to local authorities. Instead of providing financial support to individual projects, the government rolled FPS budget into the annual settlement to local authorities (SG, 2007a). Local authorities are therefore now responsible for budgeting FPS from their own financial resources. Several interviewees feared that local authorities might not prioritise investments in flood management or might not have enough financial resources. An MSP explained the challenges with this change:

“We've created a fund centrally which we could distribute across Scotland on the basis of where the highest need was for flooding. The town of Elgin is only 30000 people at most, and it's got a bill of £100 million to do the flood scheme. There's no way they could finance that from local taxation or if they did, you'd have to stop building schools and roads. That's not politically possible. The new government did away with that fund, I think it was a big mistake” (MSP 1, 09/09/2010).

Encouraging rural land management techniques were not a requirement of the EU Floods Directive, but the question triggered much debate during the legislative process for the 2009 Act and, overall, their profile was strengthened (Spray *et al.*, 2010). A large number of amendments were introduced on SFM and rural land management¹² (58 out of 199 amendments introduced). Several interviewees attributed this to the lobbying of environmental NGOs on the Scottish Parliament during the legislative process. One interviewee from the Scottish Government for example observed:

“There is no doubt that Scottish Environment Link have very strong lobby. When it comes to legislation they know how to deal with MSPs, they know how to influence legislation when it comes to parliament” (Scottish Government 1, 02/06/2009).

One MSP recalled also:

“The NGOs, RSPB and those other organisations, they're very professional and they start actively briefing you, lobbying you, trying to persuade you to a particular point of view. We worked very closely with them on the 2009 Act” (MSP 1, 09/09/2010).

SFM and rural land management were indeed a priority for environmental NGOs, as exemplified in their policy brief and consultation evidence (SEL, 2008; 2009) which call for policies that would require the use of rural land management techniques, provide adequate funding to support their implementation, and improve current knowledge on their effectiveness and benefits. These recommendations appeared in successive Parliamentary reports (RAEC, 2008; 2009), and were the subject of much debate during the legislative process (SPICE,

¹² Amendments were categorised into 9 themes spanning the issues of: 1) implementation and allocation of costs (24 amendments introduced), 2) increased collaboration (22 amendments introduced), 3) SFM (16 amendments introduced), 4) information management (24 amendments introduced), 5) rural land management (42 amendments introduced), 6) urban planning (4 amendments introduced), 7) reservoir management (8 amendments introduced), 8) fire and rescue (11), and 9) miscellaneous (48 amendments introduced).

2009). Indeed, currently, little evidence exists on how field-scale run-off propagates downstream, and therefore how rural land management techniques across a catchment can reduce peak run-off. In particular, hydrologists cast doubts as to the effectiveness of these techniques when catchments are already saturated or under the influence of extreme rainfall events. Further, the modelling of the impact of land management change on flood generation is yet un-developed, with questions in academic circles as to the feasibility of such modelling due to the complexity of hydrological processes (Tetzlaff *et al.*, 2008). More long-term catchment-scale measurements and significant improvements in modelling are needed before firm scientific methodologies can support the use of rural land management techniques. In parallel, there was no firm evidence at the time of the legislative process that rural land management techniques were better accepted than other flood management techniques such as flood walls. The opposition of key social groups such as land managers to changing land use (see also Introduction, and Chapter 4 and 5) would have suggested also significant future issues in implementation.

Despite these issues, the 2009 Bill was amended to specify that 1) rural land management techniques contributing to reducing flood risk should be mapped at a scale that is relevant for local decision-making, and 2) these techniques should be considered when selecting measures to reduce flood risks, and justifications should be provided if they are not used (SPICE, 2009). These amendments effectively strengthen the status of rural land management techniques in decision-making. Overall, devolution seems to have offered new opportunities to environmental NGOs to influence the policy process. One of the interviewees from environmental NGOs observed:

“We became very knowledgeable about processes within Parliament. So we would be able to meet MSPs and talk to them and discuss what tactics we could use for the bill. A Parliament in Scotland has offered us more opportunities and accessibility” (WWF-Scotland, 17/11/2009).

In that regard, the inclusion of rural land management techniques in flood policy should be understood in the broader context of participatory governance and

devolution. Here, one can compare the involvement of civil society and Parliament in the 2009 Act with previous statutes such as the 1961 and 1997 Acts.

The first striking feature is the extensive program of public engagement established in the period before the legislative process. Mechanisms included an Inquiry by the Scottish Parliament's Rural Affairs and Environment Committee between September 2007 and June 2008 to examine flooding and flood management, a conference in Perth (organised by the Scottish Government), a Scottish Government consultation between March and July 2008, a Flooding Bill Advisory Group to assist the Scottish Government with the development of the bill and the evidence taking process by the Scottish Parliament during the legislative process. No consultation could be identified for the 1961 Act except internal processes, and a reference to one consultation event could be identified in Parliamentary debates for the 1997 Act. The full documentation of the consultation event could however not be retrieved.

The second interesting feature is the differences in the number of amendments, and their origin. The 1961 and 1997 Acts had respectively 11 and 9 amendments adopted, and all of them were introduced by the Scottish Office. In contrast the 2009 Act was significantly modified in the legislative process with 151 amendments adopted (out of 199 introduced), mostly from the Scottish Government, but also from MSPs. It seems therefore possible that devolution may have increased the capacity of elected representatives in the Scottish Parliament to engage with, and learn from, civil society, and to influence the content of flood policy.

The first reason why this might have occurred is that devolution may have increased the general resources available to Scottish elected representatives. Pre-devolution, all Scottish legislation was considered by a single Scottish affairs committee in the UK Parliament. This placed a heavy time burden on Scottish MPs, resulting in little time to spend on Scottish legislation and poor expertise (Linch, 2001; Ioris, 2008). Devolution increased the number of Members of Parliament from 72 Scottish MPs to 129 MSPs. Some interviewees suggested that

devolution has enabled better representation of elected representatives concerns and greater specialisation on specific policy issues. One interviewee from the Scottish Government for example noted:

“Flood risk is very local in Scotland and is not as extensive as in England. Devolution has led to many more MSPs representing smaller areas, which means that it has led to many more parliamentary questions. More MSPs meant also that more time can be given to consider flooding issues” (Scottish Government 2, 21/04/2010).

Active influencing of the political process may not have been possible if elected representatives did not have the time and resources to invest in taking evidence. For example, the Rural Affairs and Environment Committee Parliamentary Inquiry into flooding and flood management was established under the leadership of two MSPs who knew that the Scottish Government intended to introduce legislation shortly afterwards. This enabled the Scottish Parliament to learn from stakeholders, resulting in a higher degree of expertise amongst MSPs (Spray *et al.*, 2010), and influence on the Scottish Government. One MSP (of a different political party to that in power) for example observed:

“Such pre-legislative scrutiny proved very valuable as it allowed the Committee to feed its thinking on the best approach to flood risk management into the Government's work at a very early stage. As a result, the bill as introduced to Parliament reflected a number of the Committee inquiry's recommendations” (Official Report, 2009, column 17,347).

The second factor is how devolution may have changed the relationship between the executive branch (Scottish Government) and the legislative branch (Scottish Parliament) in the Scottish political system compared with the UK system. With devolution in 1999, a dose of proportional representation was included in the Scottish voting system resulting in greater potential for coalition governments or minority government¹³. Interestingly, Ross *et al.* (2009) suggest that the 2009 Act was prioritised following the 2007 elections because the elections resulted in a minority government with little leverage to pursue more controversial issues. During the legislative process of the 2009 Act, the governing party (the Scottish

¹³ Only one out of four elections resulted in a majority government, two governments were coalitions between Scottish Labour and Scottish Liberal-Democrats, and one was a minority government (Scottish National Party).

National Party) had to gain support from the other parties (in particular the Conservatives and the Greens) in Parliament to get the 2009 Act passed.

Overall, participatory governance and devolution influenced the formulation of catchment flood management and rural land management techniques in the 2009 Act, although the impact remains limited. On the one hand, the Scottish Government seemed to maintain the underpinning policy lead, as exemplified by its control on the general structure and organisation of catchment flood management. On the other hand, Parliament and environmental NGOs managed to influence some dimensions of the legislation, not only because of changes consequential to devolution and the leadership of particular MSPs, but also because of the specific political context in which the legislative process of the 2009 Act occurred.

2.5. DISCUSSION

In this section, patterns of policy learning and change on integrated flood and rural land management are first discussed. The role of events and four main characteristics –coalitions, distribution of responsibilities, policy venues and devolution- underpinning policy learning and change are then explored.

Table 2.7 presents reported evidence of policy learning and change on integrated flood and rural land management. Policy change in each period can be associated with preceding policy reviews, research and pilot projects, consultations and political debates. Some policy changes do not appear to be informed by policy learning. For example, the 1961 Act does not appear to be grounded in a review of existing practices or needs, unlike the 1958 Act which profited from the Duncan Committee report. Policy learning did not necessarily influence policy change either. SEPA and WWF work on environmentally-friendly flood management did not influence policy change in the 1990s.

Table 2.7 - Policy learning and change with regards to integrated flood and rural land management

Periods	Policy learning	Policy change
1947-1992	<ul style="list-style-type: none"> Recommendations for rural drainage and for joint urban and rural arterial drainage in Duncan Committee report. 	<ul style="list-style-type: none"> Separate provisions for rural drainage in 1958 Act and for urban drainage in 1961 Act.
1992-2003	<ul style="list-style-type: none"> SEPA and WWF reports on environmentally-friendly flood management. 	<ul style="list-style-type: none">
2003-2009	<ul style="list-style-type: none"> Recommendations for improvements for river maintenance by land managers. Policy papers for catchment by academics and rural land management by SNH and WWF in national advisory group. Reviews and research on catchment and rural land management by EA and DEFRA on policy Making Space for Water. Consultations on flood management by Scottish Government and Scottish Parliament. 	<ul style="list-style-type: none"> Some minor consideration to flood management in water and rural development policy. Provisions to implement a catchment approach, and to encourage further evaluation and consideration of rural land management in flood policy in 2009 Act.

The first main observation, with regards to mechanisms influencing policy learning and change on integrated flood and rural land management, is on the impact of major events which acted as catalysts or “windows of opportunities”. They include floods in the 1990s, the 2002 flood event, the transposition of the EU WFD, the 2007 Parliament election, and the EU Floods Directive. Findings support the idea that major flood events may accelerate the rate of policy change (Tunstall *et al.*, 2005), and that political events may do so too (Kissland-Naf and Kuks, 2004; Huitema and Meijerink, 2010). Findings also support the idea that the successful exploitation of an event is dependent on existing ideas (Penning-Rowsell *et al.*, 2006) and the degree to which policy actors have prepared for it (Meijerink and Huitema, 2010). Little work on the implications of catchment flood management and rural land management techniques for Scottish flood policy predated the 1990s floods or the 2002 floods. The transposition of the EU Floods Directive was by contrast preceded by policy reviews and research on these measures, in particular academics and environmental NGOs, and advocacy work, in particular by environmental NGOs.

The second main observation is on the role of policy coalitions in Scottish flood policy. Findings reported in this Chapter suggest that policy actors were engaged

in two dominating debates. The first debate, existing since the 1950s between central government, local authorities and rural business interest groups, focuses on the allocation of costs for river maintenance. The second debate, existing since the 1990s between SEPA, environmental NGOs, local authorities and rural business interest groups, is on the environmental impacts of flood defences, the level of scientific evidence underpinning rural land management techniques, and their socio-economic impact.

Strategic collaboration between policy actors can be observed, but not to the extent of forming strong coalitions as reported by Meijerink (2005) in the Netherlands. Local authorities mostly worked individually or through two organisations representing respectively their political and technical interests. Rural business interest groups consisted of two organisations (i.e. the National Farmers Union of Scotland and Scottish Rural Property and Business Association, now called the Scottish Land and Estates) sharing a commitment to sustain rural lifestyles and enterprises, but participating in policy processes individually. Environmental NGOs were perhaps the most organised policy actor, collaborating through an established forum of around 30 environmental NGOs (i.e. Scottish Environment Link) to share information and encourage joint-action. While SEPA supported catchment flood management, it disagreed with environmental NGOs on the priority given to rural land management techniques, mainly because of the scientific uncertainties around their effectiveness. Overall, findings support the idea that individual policy entrepreneurship is a critical dimension (Johnson *et al.*, 2005) and that coalition-building is one tactic amongst others used by particular active policy actors (Huiteima and Meijerink, 2010). Perhaps the strong coalitional pattern observed by Meijerink (2005) in the Netherlands was due to the particularly strategic and significance of flood management in that country.

The third main observation is on the impact of responsibilities and powers at different levels of governance on Scottish policy learning and change. A synthesis of the impacts of central or local control on investment as identified from document analysis and interviews is provided in Table 2.8. National control may result in more financial capacity and efficient use of resources across the country,

resulting in the pooling of expertise and more equitable learning between local authorities. Local control may result in more responsive initiatives, resulting in learning in individual local authorities. Findings also suggest that joint-responsibility between central and local government has advantages, in terms of encouraging a responsive and flexible approach while securing a strong capacity for strategic investment. These observations, and similar set-ups in other countries such as England and Wales (Johnson *et al.*, 2007), Norway (Naess *et al.*, 2005) and Canada (Shrubsole, 2007), would suggest that joint responsibility would be beneficial to exploit positive impacts of both levels of control.

Table 2.8 - Impacts of national and local control over funding allocation on the level and direction of investment (Source: debates for the 1961, 1997, 2009 Acts)

Level of control	Positive impacts	Negative impacts
Nationally controlled	Larger financial resources. More efficient use of investment nationally.	Investment less responsive to local issues. Constrain investment to national criteria.
Locally controlled	Investment more responsive to local issues Greater flexibility in investment.	More limited financial resources. Less efficient use of investment nationally.

In practice however, political interest needs to be factored into the decision-making process. Experience in Scotland suggests a general lack of political interest in flood management amongst Scottish elected officials, and therefore of commitment to funding it. Several major floods were necessary to release funds both at local level and national level in the 1990s and 2000s. In that regard, joint responsibilities at local and national level may have worked against flood management because responsibilities were diluted between the local and national levels. Political concern had to be generated simultaneously at both levels of governance to ensure sufficient resources were released. In a similar way, joint-responsibility may act as a barrier for new ways of working to emerge. National government control of funding arrangements until 2007 made it difficult for local authorities to include rural land management techniques in FPS, even in the event that they were pro-active with the idea, because rules set at national level did not encourage it. When central government became more supportive of rural land

management techniques towards the end of the 2000s, few local authorities had engaged with this process.

The fourth observation is on the role of national advisory groups in policy learning and change. Mixed outcomes arose from the experience of the Duncan Committee, NTAG and FIAC. On the one hand, findings suggest that NTAG and FIAC were successful in reaching a collective agreement on the need for legislative reforms to encourage the broad idea of SFM. Fluid membership, to encourage the participation of a broader set of experts, and the leadership of the central government, to secure a more integrated approach, were critical factors. On the other hand, findings suggest that learning was structured around the expertise and interests of policy actors involved. The Duncan Committee relied on agricultural engineers' expertise; reports in NTAG and FIAC on catchment flood management and rural land management techniques were led by academics and environmental NGOs. Overall, these findings suggest that the inclusive nature of venues may be important to enable learning and collective agreements (Armitage *et al.*, 2008; Pahl-Wostl *et al.*, 2010). They are also coherent with the idea that learning is filtered through interests and relations of power (Diduck, 2010) and is closely associated with the entrepreneurship of policy actors (Meijerink and Huitema, 2010).

When examining the impact of advisory groups on policy change, it appears that learning resulted in policy change when interventions under scrutiny were within the portfolio of the managers of the policy venue (e.g. flood awareness, mapping and warning associated with flood policy team). Until 2009, little policy change occurred for catchment flood management and rural land management techniques in part because it required integration with other policy domains, such as water, agriculture or rural development. Given the flexible nature of NTAG and FIAC, and their capacity to influence, to some extent, policy, these findings do not fit well into the observation from Pahl-Wostl *et al.* (2010) that informal networks have the drawback of not influencing policy. These findings are more coherent with the idea that different venues are more or less receptive to different policy ideas (Meijerink and Huitema, 2010).

The fifth and final observation is on how the devolution of statutory powers changed Scottish flood policy dynamics. Despite devolution, Scotland appears to have had little capacity to take forwards its own approach in flood policy, and, overall, has followed England's policy lead. DEFRA and the EA engaged in a large-scale programme of scientific and policy reviews, and took an incremental approach to integrated flood and rural land management by developing, back in 2001, non-statutory catchment flood management plans (Burton *et al.*, 2003) and, more recently, by changing the legislative framework through the recent Flood and Water Management Act 2010. In the same timeframe, the Scottish Government relied on voluntary input from stakeholders, and took forward significant policy change for integrated flood and rural land management only in 2009. This finding is coherent with Cairney *et al.* (2009) observation that devolved governments in the UK have tended to follow lead at UK level.

Against this general background, findings suggest that, nevertheless, Scotland had dynamics of its own since devolution. The impact of devolution on the relationship between the Scottish Government and the Scottish Parliament in particular is complex. Ison and Watson (2007) conclude that devolution has helped trigger more social learning in Parliament in the case of the Water Environment Water Services (Scotland) Act 2003. The research reported in this Chapter indicates that devolution increased the capacity of Scottish policy actors, including political actors, to learn and influence the policy process. Members of Parliament were for example able to perform more in-depth, extensive enquiries, and specialise further on the technical dimensions of flood management for the 2009 Act than the 1961 and 1997 Acts. Devolution has in this sense increased political scrutiny of Scottish legislation, a similar observation to Ross *et al.* (2009) on the impact of Scottish devolution on environmental legislation. These findings should be qualified by two observations. First, following devolution, there have still been limited opportunities to take forward legislative change for flood policy. Second, the decision to take forward the 2009 Act in the Scottish Parliament was ultimately by the Scottish Government itself. Overall, findings on the relationship between the Scottish Government and the Scottish Parliament echo the

observation from Kingdon (2003) and Schlager (2007) that the relationship between policy and political streams (i.e. the activities of policy and political actors) has an important influence on policy change.

Findings indicate that stakeholders, via their influence on Members of Parliament, may have increased their impact on the policy process with devolution, although the broader shift towards participative governance may also have contributed to their closer involvement in the decision-making process. The 2000s have seen greater engagement of environmental NGOs with the Scottish Executive (and the Scottish Government) through their input to national advisory groups and governmental consultations. Environmental NGOs worked closely with MSPs during the legislative process of the 2009 Act, a finding that echoes the observations from Ison and Watson (2007) for the 2003 Act. Participative democracy theory would support the close involvement of stakeholders in the decision-making process because stakeholders may increase the range of ideas considered, their scrutiny, and the role of justifications required to support different policy positions (Munton, 2007). The Scottish example would support the idea that the move towards participative democracy, including devolution, has improved civil society's access to the policy process, and re-balanced power previously favouring local authorities and rural businesses. However, it remains to be seen whether this process was equitable for other civil society groups, which may not be as well-organised and resourceful as environmental NGOs do.

2.6. CONCLUSION

The research reported in this Chapter extends knowledge of learning processes at the national policy level, and supports several ideas of the policy learning and the adaptive governance literature. Major societal events such as major floods and political events can work as catalysts for policy change, not necessarily by accelerating the formulation of new ideas in flood policy, but by accelerating the adoption of existing ideas. They offer opportunities for policy actors to advocate and build support for their policy ideas. Individual entrepreneurship is clearly a

critical factor, but actors need access to the policy process to be influential. The Scottish experience suggests that policy venues such as advisory groups and Parliamentary Committees are important mechanisms in that regard, and that their close relationship with formal decision-making process does not necessarily work against policy learning. To be successful, policy venues need to be inclusive, and power relationships need to be actively managed. This requires attention to stakeholder interest (i.e. their capacity and willingness to participate), and the way scientific evidence is used to inform decision-making.

Research outcomes suggest that rules governing the linking of political and policy streams influence the formulation of new policies. The Scottish experience indicates that devolution of statutory power may lead to greater responsiveness to local priorities. However, evidence also suggests that this is not an automatic process since the Scottish Parliament still had limited capacity to influence the governmental agenda and decision-making. Also, devolution of statutory powers together with greater participatory governance have opened new (limited) opportunities for civil society to influence decision-making in Scotland. While these processes can increase responsiveness to local priorities, the Scottish experience suggests that they may not necessarily be fair, because they modify the balance of power between stakeholders. More resourceful or organised groups can therefore take advantage of participation and devolution at the expense of other groups.

The work reported in this Chapter focused on policy learning and change in Scottish flood policy. Empirical evidence was gathered through a combination of documentary analysis from different sources, and interviews. Further work could extend some analytical dimensions explored in this research, for example by examining the impact of types of advisory groups or of institutional nesting on policy learning and change. Further work could use cognitive tests on key stakeholders to evaluate learning in different ways. It could also examine the ways in which further learning can be fostered through different interactional strategies.

The 2009 Act institutionalised catchment flood management and rural land management techniques around the seemingly consensual concept of SFM. It was shown however that different understanding and emphasis underpin policy actors' perception of SFM, which suggest future challenges in fostering collective agreement and support during implementation. The next Chapter continues the analysis of adaptive water governance in national policy processes, and focuses on cross-policy formulation and implementation. In particular, it presents an evaluation of how integrated flood and rural land management is embedded in relevant policies, and what mechanisms may foster further policy integration.

Chapter 3 Adapting National Policies for Integrated Flood and Rural Land Management

3.1. INTRODUCTION

The aim of this Chapter is to further evaluate the ideas of adaptive water governance in national policy processes by focusing on cross-policy formulation and implementation. The enactment of the Flood Risk Management (Scotland) Act 2009 (the 2009 Act) has put integrated flood and rural land management firmly on the Scottish Government's agenda. However, the 2009 Act merely established general principles and mechanisms in Scottish flood policy. The development and implementation of the concept in Scotland require further adaptation of the national policy framework. In this Chapter, the coordination or "integration" between flood, water and other rural land management policies is examined, and how integration can be improved is discussed.

Research on policy integration in the context of flood and rural land management in Scotland focuses on the institutional linkages between flood and agricultural policies (Gonzales, 2006; Kenyon, 2007) and on the policy framework for river restoration (Wharton and Gilvear, 2006; Gilvear *et al.*, 2010). These studies identify barriers to implementing rural land management techniques for flood alleviation in Scotland, including: restrictive rules in agricultural policies at European level, a lack of adequate incentives in rural development policies, a negative "cultural" attitude within responsible authorities where most flood experts are engineers (i.e. poorly versed in the benefits of a catchment approach and the use of rural land management techniques), and a lack of integrated strategy to deliver river restoration at the catchment scale. These studies have

focused on a restricted number of flood, water and rural policies (some of them now outdated), and they have had little regard to the mechanisms which may encourage further integration.

Broader research on flood management supports that, internationally, relevant policies tend to be poorly integrated. For example, in their multiple case-studies around the world, Alphen and Lodder (2006) observe that responsible organisations for environmental protection, rural land management, spatial planning, and emergency support are rarely coordinated. In the UK, Everard *et al.* (2009) conclude that UK governmental economic incentives work against an ecosystem-based approach to flood management since it encourages conflicting land management practices. Integrated Water Resource Management (IWRM) posits that water issues may be resolved by integrating roles, responsibilities, and action across government and non-state actors, although it is as yet unclear how IWRM can be implemented successfully (Lundqvist, 2004; Mitchell, 2005; Watson *et al.*, 2007). Guidance on the type of governance mechanisms most conducive to the formulation of integrated policies for flood and rural land management remains rare.

From an adaptive (water) governance perspective, multiple policies are not necessarily detrimental. This is because the resilience of social-ecological systems may be increased in polycentric governance systems, with independent decision-making centres enabling the failure of sub-systems without compromising the whole (Folke *et al.*, 2005; Huitema *et al.*, 2009). Collaboration, preferably through informal and self-emerging participative processes, is used in polycentric systems to increase co-ordination and coherence between policies (Huitema *et al.*, 2009; Pahl-Wostl *et al.*, 2010). There remains however little guidance in the literature on the adequate design of polycentric and participative processes increasing the adaptability of water governance systems (Kallis *et al.*, 2009).

Scotland offers a good empirical case for the examination of national policy integration for integrated flood and rural land management. As discussed in Chapter 2, there have been in recent years several attempts at better co-ordinating

flood management with other water, agricultural and rural land management policies. Much can be learned from these successes and failures. Drawing on research on the policy process, the concept of policy integration is used to examine synergies and conflicts between policies relevant to integrated flood and rural land management, and evaluate processes facilitating their further integration. Theories on policy integration are first briefly discussed, illustrated by research on IWRM. The research design is outlined, followed by an inductive analysis of flood, water and rural land management policies. The discussion and conclusion reflect on the main factors influencing, and the mechanisms underpinning, policy integration, and on lessons learned for adaptive governance.

3.2. THEORETICAL CONTEXT

Public policy integration is itself an ambiguous term with much debate about its meaning, measurement, and operational implications (Persson, 2004). Fundamentally, policy integration may refer to a process occurring within one policy or across two or more policies. For example, a policy may unilaterally integrate characteristics of another policy to improve compatibility. Alternatively, distinct policies may be unified to create a new policy with original characteristics. The production of a unified policy is not necessarily superior to policy coordination: better coordination of two existing, well functioning policies may be more effective than the creation of a new more inclusive, but less established policy (Briassoulis, 2004). Working across policy regimes may also offer the opportunity to better exploit their relative advantages to produce complementary influence on society (Gunningham and Sinclair, 1998).

More precisely, public policies can be described as regimes or nested systems of procedures structured around 1) a specific representation of a societal problem to be tackled by the policy, 2) a set of objectives to be achieved, and 3) a range of instruments and procedures to achieve policy objectives (Howlett, 2009). Policy regimes may induce social change through administrative action (e.g. bureaucracies); coercive means (e.g. regulations), or the provision of incentives in

the form of financial or knowledge gains (e.g. markets, subsidies, advice provision) (Howlett, 2009). Poorly integrated policies may have contradictory problem constructions and objectives, and operate independently from one another. Successfully integrated policies may have common objectives, and operate in close collaboration with one another.

Conflicts between policies may arise when distinct policies deal with different dimensions of the same ecological processes, human activities, or environmental problems, but do not recognise these other dimensions (Briassoulis, 2004). For example, IWRM is underpinned by the idea that water issues should be integrated into other policies, such as agriculture, because these policies influence human activities that may in turn impact the hydrological cycle. Distinct problem representations may result in policies operating over different objectives, instruments, and procedures (and their spatial and temporal scales). Better integration therefore would require a more common construction of policy problems (Briassoulis, 2004), and the identification of a balanced set of beliefs, values, norms, and goals (Persson, 2004). For example, agricultural policies would need to recognise the positive and negative impacts of agriculture on the water environment, and vice-versa. IWRM itself may not be balanced because it prioritises water resources over agricultural production (Medema *et al.*, 2008). Not only should agricultural policy integrate water issues, water policy should also integrate agricultural issues (Fish *et al.*, 2009).

Integration may not necessarily occur across the whole policy regime (Briassoulis, 2004; Persson, 2004). Policies may for example have common objectives, but poor procedural integration, resulting in incoherent implementation. Alternatively, policies may have conflicting objectives, but strong collaboration at the operational level, resulting in synergistic practices. Briassoulis (2004) identifies two broad types of procedures improving policy integration: vertical and horizontal ones. Vertical procedures refer to mechanisms within a policy to incorporate and implement other policies' objectives. These include for example Environmental Impact Assessments that help to evaluate cross-sectoral impacts of policies, and identify trade-offs and synergies (Persson, 2004). Horizontal

procedures refer to the linkages across policies to foster exchange and partnership working. They may include the integration of administrative structures and mandates, for example the merging of governmental departments and agencies. Alternatively, they may include the strengthening of cooperation through greater communication, workshops and meetings, and the production of integrated strategies (Persson, 2004; Jordan and Lenschow, 2010).

Researchers in water management have often called for the set up of formal, sometimes statutory, river basin organisations that would provide the leadership needed to overcome government inertia and the authority to transcend sectoral interests (Hooper, 2003). The creation of new mandates and organisations, however, may be costly and may result in the creation of new boundaries with consequent further fragmentation, delay, and inaction (Moss, 2004; Mitchell, 2005). Similarly, because of their strict procedures and specialised expertise, large water bureaucracies are thought to be inflexible and inadequate for present day problems characterised by uncertain and emerging conditions (Watson *et al.*, 2009). New styles of governance based on collaboration between actors through open dialogue and negotiation in participative processes are considered better adapted (Moss, 2004; Mitchell, 2005). Several scholars call for stronger integration between water and agricultural policies through collaborative policy communities (Fish *et al.*; Mollinga *et al.*, 2009; Ferreyra *et al.*, 2009), and a coordinated and diverse mix of policy instruments (Blackstock *et al.*, 2009).

Reforming policy regimes to increase integration is not an easy task because policies are nested within a system of rules, beliefs, values, and interests which limit their scope for reforms (Howlett, 2009). For example, processes of globalisation and greater local autonomy may limit the influence of national policy regimes, and thereby the potential for successful policy integration when only reforming at national level (Vogler and Jordan, 2003). IWRM itself is constrained by social and political factors (e.g. different understandings, opposing interests; see Chapter 1). Jordan and Lenschow (2010) blame the failure of many past attempts to integrate environmental issues into sectoral policies on a lack of political commitment. They argue, as well as other scholars of policy integration

(e.g. Briassoulis, 2004) that, to be effective, policy integration needs strong political support, multi-level reflexive collaboration, joint responsibilities, and the sharing of resources. Such condition may create trust, joint problem construction, a feeling of inter-dependence, and the search for innovative solutions, shared values, common visions and consensus. Similarly, in their comparative analysis of integrated water governance, Bressers and Kuks (2004) suggest that joint-problem perception, realisation of win-win outcomes, political leadership, a tradition of cooperation, and adequate institutions are necessary conditions for greater integration. Sproule-Jones (2002) observed that creating an inclusive process and inter-dependence between organisations may improve the success of policies to improve water quality. Mitchell (2005) warns nevertheless that such approach to IWRM is a costly and complex process, and must be used where the benefits of coordinated action clearly exceed the costs of the communication and negotiation needed.

Overall, this section has presented how policy integration may occur in the different components of a policy regime such as the construction of societal problems, objectives, instruments and procedures. Mechanisms to increase integration were presented, and collaboration was shown to be a particularly important strategy, but difficult to achieve. The next section presents the methods used to explore these dimensions in selected Scottish policies relevant to integrated flood and rural land management.

3.3. RESEARCH DESIGN

3.3.1. Data Collection

Five separate policy areas were examined because of their direct and significant impact on integrated flood and rural land management: flood, water, agriculture and rural development, natural heritage, and forestry. The following additional relevant policies were taken into account, but are not discussed in detail in this Chapter:

- *Soil policy*: a Scottish Soil Framework was developed in 2009 (SG, 2009b). While it provides an overview of the state of Scottish soils and makes recommendations as to the integration of soils issues in other policies, it sets no regulatory or economic instruments around soil management. It was considered that, while there was the potential for further policy development, the policy was still in its infancy.
- *Urban spatial planning*: the Spatial Planning Framework 2 (SG, 2010b) regulates the expansion and modification of urban land, and therefore may have an impact on rural land use. In addition it frames a number of local engagement initiatives such as community councils and community planning partnerships. However, urban planning is mostly limited to the regulation of the built environment, rather than the management of the rural landscape which is the core interest of this Chapter.
- *Climate Change Adaptation Framework and the Land Use Strategy*: the Climate Change Adaptation Framework (SG, 2009a) is a strategic document with the overall aim to address vulnerability to climate change in Scotland. The Land Use Strategy (SG, 2011b) sets out priorities and common principles for sustainable land use in Scotland. These strategies offer integrative approaches for landscape-wide issues, but they are still too recent to examine their impact on policies and practice. They are nevertheless briefly included in the Discussion as contextual elements for future policy integration.

Data were collected through documentary analysis and interviews. A total of 66 documents in the six policy areas were examined (Appendix D). They were retrieved by exploring web-sites of responsible organisations and recognised archives including the UK and Scottish National Archives, Hansard and the Official Report. Official government publications (e.g. laws, policies, strategies, plans and guidance) were used to characterise the content and structure of policies. Internal administrative documents, transcripts of Parliamentary debates, governmental publications, minutes of meetings, publications from stakeholders, and academic publications (e.g. Masters and PhD theses and journal articles) were also used to reconstruct the issues of policy integration. Issues around the four

checks needed on documentary analysis (i.e. authenticity, credibility, representativeness and meaning – see Research Design in Chapter 2) were limited. Documents were retrieved from established sources, and they had been published in the last 10 years. Interviews complemented their analysis which reduced further potential issues with representativeness and meaning.

Data from the 16 interviews carried out for Chapter 2 were used. Interviewees represented a wide spectrum of policy actors closely involved at the time of research in the development of Scottish national flood policy and of the other policies selected for examination in this Chapter. They included civil servants, elected officials, representatives of local authorities, environmental regulators, representatives of environmental and agricultural interest groups, and academics. Topics covered past and existing dynamics of policy integration around the issues of catchment management and rural land management. More information on interview procedures and techniques is presented in Chapter 2 (see Research Design).

3.3.2. Data Analysis

The analytical process was inductive. Analyses of documents and interviews were carried out separately, and outcomes compared. The analysis of documents focused on identifying how selected policies described the links between flood and rural land management in problem representation and policy objectives. Policy instruments and procedures that could influence integrated flood and rural land management were also identified, and their characteristics mapped out.

Interviews were analysed using thematic analysis as described in Chapter 2. Coding through NVivo 8 led to the creation of 1,031 first-level codes. Each code was then associated with 20 first-level categories (one code could be associated with one or several), which themselves lay within four second-level categories as shown in Figure 3.1. The 20 first-level categories were based on the different dimensions of a policy in terms of problem representation, objectives,

instruments, and procedures. Codes for each of the 20 first-level categories were retrieved into word documents. Patterns of agreements and disagreements between codes were explored to test the nature and strength of 1) the internal dimensions of each category, and 2) relationships with other first-level categories. The result was to provide, for each first-level category, an understanding of its main characteristics and how they fitted with other categories.

The outcomes of the thematic analysis were compared with results arising from the documentary analysis. The results section presents, for each policy, an analysis of the documentary and interview evidence. In the discussion, the main results are compared with: 1) concepts and theories on policy integration, and 2) results from research in other contexts, in order to test the relevance, fit and broader applicability of the results (Ritchie and Lewis, 2003; Burnham *et al.*, 2008).

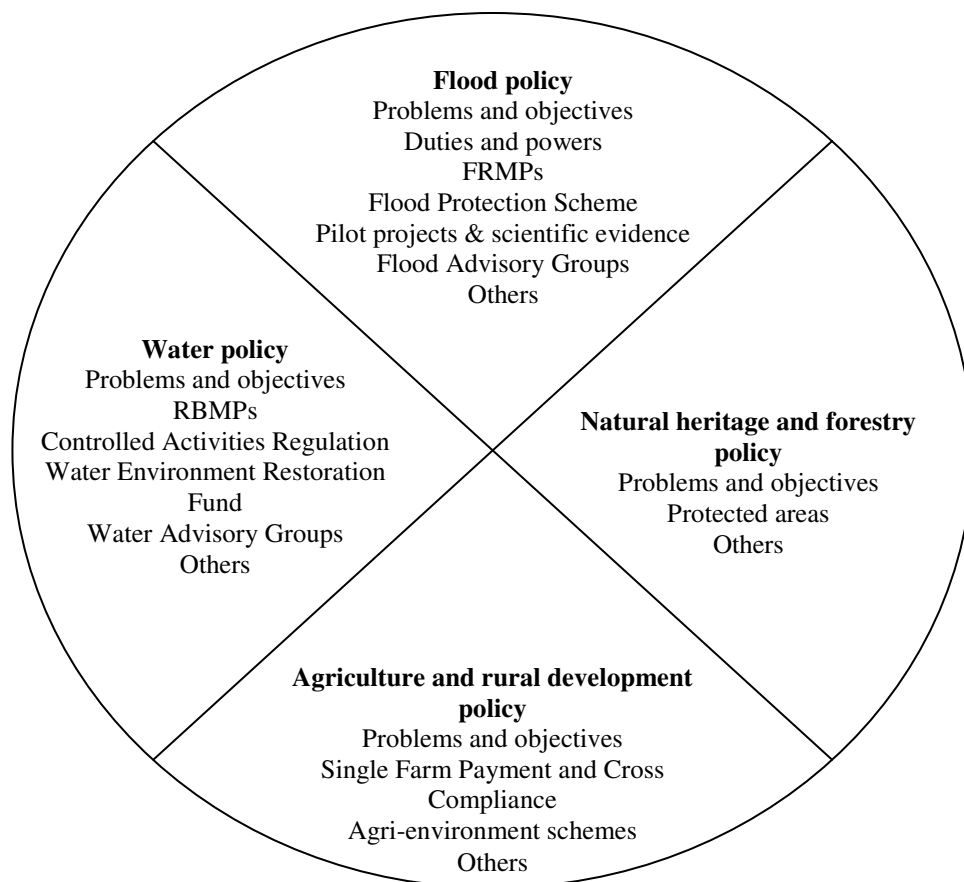


Figure 3.1 - Categorisation of concepts arising from the analysis of interviews, comprising four second-level categories and 20 first-level categories within these

3.4. RESULTS

Table 3.1 presents an overview of the main objectives and operational characteristics of the reviewed policies, and Table 3.2 presents an overview of the level of integration between these reviewed policies. Overall, each policy appears to have its own objectives, management scales, organisational arrangements (e.g. responsible organisations and networking instruments), and regulatory and economic instruments.

The Results section presents a detailed discussion of these characteristics for each policy in turn, focusing on dimensions relevant to integrated flood and rural land management. It is divided into four sub-sections: flood policy, water policy, agricultural and rural development policies, and forestry and natural heritage policies.

3.4.1. Flood Policy

Current flood policy is driven by the 2009 Act which transposes the EU Floods Directive into Scots law. Overall, the 2009 Act encourages governmental action in flood management with a general duty to “*act with a view to reduce overall flood risk*”¹⁴. The 2009 Act identifies three main organisations as responsible authorities for flood management in Scotland (Figure 3.2). The Scottish Environment Protection Agency (SEPA) is responsible for providing flood warnings, mapping flood risk, preparing flood risk assessments, and developing and implementing district Flood Risk Management Plans (FRMPs). Local authorities are responsible for developing and implementing local FRMPs. Scottish Water’s responsibilities are mainly limited to urban drainage. Other responsible authorities can be included if necessary. In addition, Scottish Ministers and the Scottish Government have an oversight role with regards to policy guidance, implementation, and funding allocation.

¹⁴ 2009 Act, Part 1, Section 1, (1).

The 2009 Act sets in statute a new approach to flood management in Scotland which values catchment flood management and rural land management techniques (see also Chapter 2). The policy framework was nascent at the time of the research; however policy documents, guidance, and interviews with stakeholders revealed several opportunities for, and barriers to, the implementation of integrated flood and rural land management in Scotland. This is explored in the next three sub-sections by examining in more detail how documents set out, and interviewees perceive: 1) catchment flood management, 2) the selection of rural land management techniques in the planning process, and 3) the implementation of rural land management techniques.

3.4.1.1. Catchment Management Planning

Catchment management in Scottish flood policy is a spatially nested exercise where planning and implementation cycles overlap at sub-catchment, catchment and river basin levels. The 2009 Act requires flood management planning to occur in relevant hydrological units, the boundaries of which must follow at least those of sub-catchments. Two levels of planning are set out, one at district level and one at local level. SEPA is responsible for preparing and reviewing FRMPs at the district level every six years¹⁵; local authorities are responsible for FRMPs at local level¹⁶. The analysis of documents and interviews brought out three main issues with regards to catchment management planning: the setting up of boundaries, participative arrangements, and future funding allocation. They are examined in turn.

¹⁵ 2009 Act, Part 3, Section 23.

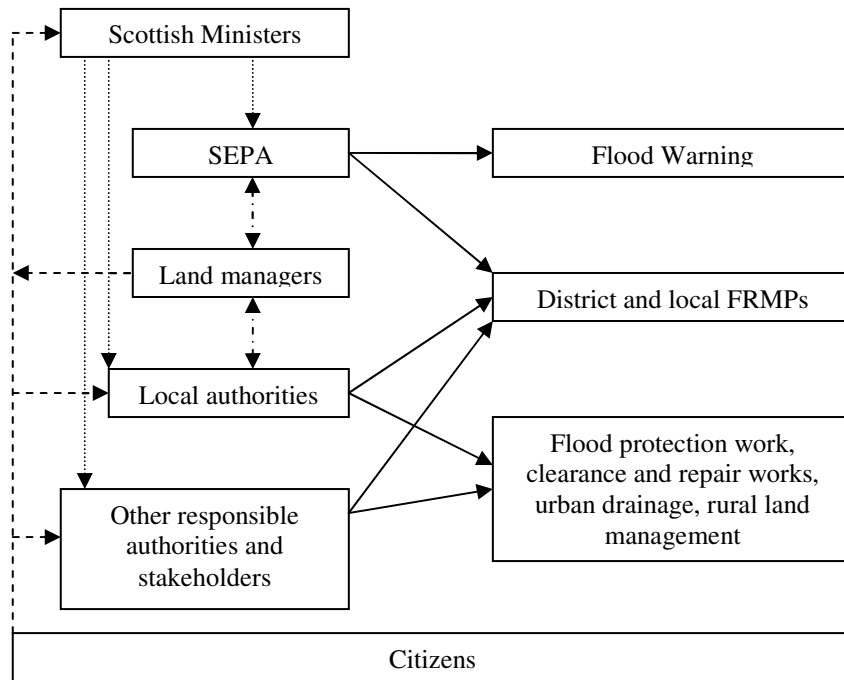
¹⁶ 2009 Act, Part 3, Section 29.

Policy	Main objective	Management timescale	Management units (number)	Main organisations involved	Network instruments	Regulatory instruments	Economic instruments
Rural development	To support the competitiveness of agriculture and forestry, to preserve the environment, and to support rural development.	SRDP: 2007-2013. Management cycle: 7 years.	National. Regional (11).	Scottish Government. SNH. Forestry Commission.	Programme Monitoring Committee. National Proposal Assessment Committee. RPACs. SEARS. Rural Direct. Scotland National Rural Network.		LFASS. LMOs. RPs.
Natural heritage	To preserve and enhance the natural heritage.	Targets for 2030. Implementation plan to be reviewed every 3 years.	National. Area management units (7). Special Areas of Conservation. Special Protection Areas. Sites of Specific Science Interest. Habitats and Species.	Scottish Government. SNH.	Scottish Biodiversity Forum. Ecosystem groups. Local Biodiversity Partnership. SRDP groups. SEARS.	SNH licensing. Land Management Orders.	SRDP.
Forestry	To improve lives of people through the benefits of woodlands and forests. To increase the surface of forested areas to 25% of Scottish land use.	Target for 2050. First Strategy: 2006. Management cycle: possible review after 5 years.	National Forest districts (10).	Scottish Government. FC-Scotland.	National Forestry Forum. Regional Forestry Fora. SRDP groups. SEARS.	UK Forestry Standards and Guidelines. Felling licences.	SRDP.

* In addition to Guidance, Conferences, Workshops, Demonstration sites, Monitoring, & Research

Table 3.2 - Integrated flood and rural land management dimensions of flood, water and rural land management policies

Policy	Integrated dimensions	Non-integrated dimensions
Flood	<ul style="list-style-type: none"> • District boundaries same as WFD river basin boundaries. • Selection of measures to take into account WFD objectives, environmental designations, spatial and contingency planning. 	<ul style="list-style-type: none"> • Local district boundaries not same as WFD Area boundaries. • Few linkages with rural land management policies mentioned.
Water	<ul style="list-style-type: none"> • 2003 Act requires promotion of SFM and allows changes in environmental objectives if flood prevention scheme is needed. • RBMP recognises links with flood management, and prioritises measures with multiple benefits, including flood management. • CAR regulates activities that may exacerbate flood risk. • WERF takes into account flood management in project selection. 	<ul style="list-style-type: none"> • RBMPs do not have specific measures to reduce flood risk, they only promote those that may have a flood risk reduction side benefit. • CAR is not directly aimed at regulating activities that exacerbate flood risk.
Agriculture	<ul style="list-style-type: none"> • Cross-compliance with SMRs and GAECs can contribute to reducing flood risk. 	<ul style="list-style-type: none"> • Some GAEC measures may conflict with flood management.
Rural development	<ul style="list-style-type: none"> • SRDP identifies flood management under Climate Change priority • LMOs and RPs can contribute to reducing flood risk, and some are targeted to flood management. 	<ul style="list-style-type: none"> • SRDP identifies flood risk as an urban issue, does not make links between agriculture and flood risk, and does not mention flood management in most measures.
Natural heritage	<ul style="list-style-type: none"> • Implementation plan of Scottish Biodiversity Strategy identifies drainage, river and flood defence works as contributing to biodiversity loss, and advocates restoration techniques in flood management. • Natural Heritages Futures identify links between biodiversity and flood management, and recognise the role of land uses in reducing flood risk. • Climate Change and Natural Heritages Action Plan and Applying an Ecosystem Approach discuss the need to build resilience against flooding through rural land management. 	<ul style="list-style-type: none"> • Scottish Biodiversity Strategy makes few links between biodiversity and flood management. • Natural Heritages Futures for Farmland does not refer to flood management.
Forestry	<ul style="list-style-type: none"> • Scottish Forestry Strategy identifies complex links between forestry and flood management. • Implementation plan for Scottish Forestry Strategy identifies need for research on links between forestry practices and flood risk. • Forestry Standards and Guidelines make links between forestry and flood management through Guidelines. • Forestry Commission guidance on woodland creation encourages consideration of flood management benefits. 	<ul style="list-style-type: none"> • No reference to flood management in the indicators of Scottish Forestry Strategy implementation plan. • No Forestry Standards linked to flood management.



Legend

Solid line: Responsibilities

Dashed line: General taxes and charges (e.g. income tax, council tax)

Dotted line: Grant-in-aid

Double headed arrow line: Payment and compensation mechanisms set out in 2009 Act

Figure 3.2 - Responsibilities and funding streams for flood management in Scotland

A stakeholder consultation was carried out by SEPA in 2010 in order to identify the most acceptable boundaries for management planning (SEPA, 2010a; 2010b). In the consultation document, SEPA proposed that the boundaries for FRMPs should be based on statutory requirements (see above), the needs of local authorities, and alignment with plans prepared under the EU WFD¹⁷. In Scotland, boundaries under the EU WFD do not strictly follow catchments. Instead, catchments are aggregated into two River Basins, themselves subdivided into eight Areas (SEPA, 2005). In the consultation document, SEPA proposed using the same two River Basins for district FRMPs. The drawing of boundaries for local FRMPs was a matter of more debate at the time of research, with an early

¹⁷ The EU Floods Directive recommended, but not required, the use of river basin district boundaries set out by the EU WFD (see the Opening Paragraph 17 of the EU Floods Directive).

option of 20 management units (SEPA, 2010a)¹⁸. Ultimately, the 2009 Act requires that boundaries for local FRMPs are also based on Potentially Vulnerable Areas, to be identified through flood risk assessments for each district. These different management scales are illustrated schematically in Figure 3.3.

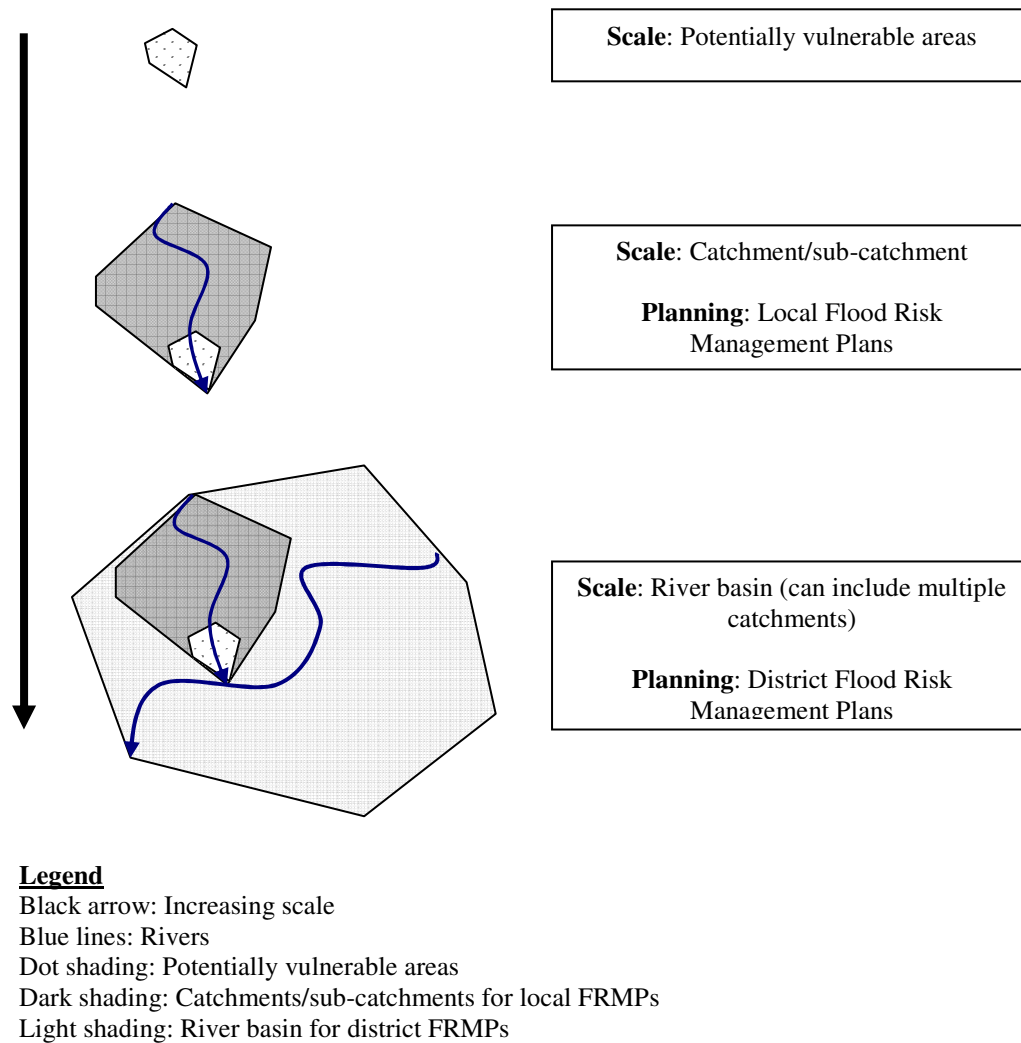


Figure 3.3 - Schematic representation of management planning scales in Scottish flood policy

¹⁸ The latest figure became available in December 2011. A total of 14 areas for local FRMPs and 243 areas Potentially Vulnerable Areas were identified (SEPA, 2011b).

Responses to the consultation show that several stakeholders, in particular local authorities, preferred fewer management units (i.e. less than the proposed 20) to limit administrative costs (SEPA, 2010b). Comments from interviewees on management planning also suggest that setting catchment boundaries at the local level was mildly controversial, mainly with regards to the cost-effective allocation of management units between local authorities while working at the catchment scale. To some extent, the 2009 Act anticipated this issue. It requires that, where a catchment or sub-catchment crosses local authorities' boundaries, one lead local authority should be selected in order to drive the planning process¹⁹. Several responses to the SEPA consultation on local FRMPs nevertheless stressed that the principles underpinning the selection of the lead local authorities were not yet clear and that the process may raise issues of accountability, for instance when non-lead local authorities must sign up to local FRMPs even though they were not in charge of the planning process (SEPA, 2010a).

Issues regarding collaboration for catchment management planning are similar to issues arising from the nested nature of FRMPs. Interviewees questioned how SEPA and local authorities could overcome potentially divergent objectives in the context of limited resources between district and local FRMPs. For instance:

“There are questions as to how SEPA will impose a national strategic framework and how local authorities are going to influence the writing of the national plan. That was repeatedly seen as a source of conflict and tension in the consultation for the 2009 Act. What if, for example, SEPA comes up with a national plan and groups of local authorities say: we are not going to do that, we don't have any money” (Academic 1, 06/07/2009).

The 2009 Act sets up a duty on responsible authorities to “as far as practical adopt an integrated approach by co-operating with each other so as to coordinate the exercise of their respective functions”²⁰, and a power “to enter in agreement with each other”²¹. The aim of the duty is to encourage, and not mandate, an integrated approach between responsible authorities. The Scottish Government hopes that most issues with regards to management planning will be solved through strong partnership working between responsible authorities. The power in

¹⁹ 2009 Act, Part 3, Section 34 & 39.

²⁰ 2009 Act, Part 1, Section 1, (2) (d).

²¹ 2009 Act, Part 1, Section 1, (3).

the 2009 Act provides a mechanism to formalise agreement if needed. In guidance on Sustainable Flood Management (SFM) published in 2011, the Scottish Government describes at length how responsibilities must be shared collectively, and that management planning should be underpinned by strong commitment by responsible authorities, co-ownership of plans, and joint working and funding arrangements where possible (SG, 2011a). A Scottish Government interviewee explained:

“Money comes from all sorts of sources: you’ve got local authorities with the main pot of money, SEPA with flood warning and Scottish Water with their investment plans. It is impossible to centralise all. It is about partnership. SEPA has the co-ordinating role between district high level plans, but the money sits with local authorities who are answerable to their constituents” (Scottish Government 1, 02/06/2009).

To enable collaboration, the 2009 Act also requires the establishment of advisory groups. Advisory groups had been set up before the 2009 Act to foster exchange at national level (see Chapter 2), and at the local level, between flood engineers and planners in local authorities, Scottish Water and SEPA through Flood Liaison and Advice Groups (FLAGs, see CoSLA, 2003). Currently, the Scottish Government chairs the Scottish Advisory and Implementation Flood Forum (SAIFF), while SEPA and local authorities are setting up Flood Risk Advisory Groups (FRAGs) under the 2009 Act to help them develop and implement FRMPs. The role of FRAGs is to foster exchange not only between SEPA and local authorities, but also amongst the broader policy community and society at large, and offer a platform for negotiation and the reaching of consensus.

Successful information exchange and some partnership working were achieved through FLAGs, possibly because of their non-statutory nature (CoSLA, 2003). With FRAGs, the 2009 Act provides a new, statutory driven framework to foster collaboration. Interviewees drew on their experience of the EU WFD Advisory Groups to comment on the potential future functioning of FRAGs. Despite a general acknowledgment of their useful role, interviewees criticised their lack of real influence on decision-making. Some stressed the permanent issue of resourcing for participation in stakeholder groups. The interviewee from the rural business association for example observed:

“Flooding is of interest but it is not our priority number 1. It is an important issue but we don’t have the same resources as some organisations do, so we have to think carefully about all the issues we get involved in” (NFUS, 08/10/2010)

Others were critical of the excessive control of SEPA over the EU WFD river basin management planning process, at the expense of other stakeholders and local communities, suggesting that flood policy may be going in a similar direction:

“The Scottish Government and SEPA talk about partnership working and then you realise they're talking about local authorities and SEPA. The advisory groups and WFD haven't been hugely successful and they want to do better than that but they are falling into the same traps of kind of going away and working on things then presenting it to people. What I am hearing is: “we'll be telling them, we'll be taking these assessments to them rather than we will be developing them with stakeholders and local communities”. There's still a danger of the advisory groups just being a kind of token consultation rather than active engagement” (SNH 1, 11/10/2010).

Proposals in the SEPA consultation documents were not designed to closely involve communities in the decision-making process itself. The following engagement mechanisms were proposed: media (e.g. news management, media relations, social media, SEPA and partner websites, e-bulletins), publishing (e.g. printed and online, leaflets, newsletters), and evaluation (e.g. market research, media monitoring) (SEPA, 2010a). These mechanisms help in informing communities (or obtain information from them), but do not involve them in decision-making.

Finally, with regards to funding allocation in catchment flood management, and as discussed in Chapter 2, interviewees pointed out that greater autonomy of local authorities following the re-organisation in the funding of Flood Prevention Schemes (known as Flood Protection Schemes under 2009 Act) in 2007 (i.e. the Scottish Government abandoned its responsibilities in co-funding FPS, transferring the budget and all responsibilities to local authorities) may create several issues. In such system, local authorities may have, individually, widely different investment capacity, resulting in inconsistencies across Scotland. Local authorities may also be tempted to avoid investment in flood management,

possibly leading to poor cooperation with SEPA and poor delivery. Three duties in the 2009 Act may reduce the risk associated with the move towards greater autonomy of local authorities. First, Scottish Ministers must have regard to FRMPs when allocating resources²². The duty may encourage greater financial commitment by the Scottish Government in the delivery of district and local FRMPs and some monitoring in implementation²³. Second, the Scottish Government must provide the Scottish Parliament with an annual report on the implementation of the 2009 Act²⁴. Members of the Scottish Parliament added the duty as an amendment during the legislative process of the 2009 Act in order to maintain oversight.

The Member of Parliament responsible for introducing the amendment explains that the duty may secure continued political awareness of flood policy and provide an avenue to build political support for further policy integration in the future:

“Whatever happens, the world is going to be different in the future and therefore we require constant mechanisms to review flood management. There has to be an assessment of where we have got to. This would make sure there could be a debate saying to the government that you need to put more money into this or you need to do more about this. It was to create an opportunity for further ongoing dialogue about all of that, to make sure that this issue just didn’t go away, but was constantly going to be on the agenda” (MSP 1, 09/09/2010).

Finally, under the 2009 Act, Scottish Ministers may act as a “broker” where disagreement remains between partners (e.g. local authorities, SEPA, Scottish Water, etc) over the design and funding of FRMPs or specific projects.

This sub-section mainly focused on opportunities, barriers, and mechanisms framing catchment management planning. The next sub-section focuses on the selection of rural land management techniques during the planning process.

²² 2009 Act, Part 3, Section 41.

²³ The Scottish Government provides an annual financial contribution to local authorities’ expenditures. In return, local authorities must meet a number of National Outcomes. The Scottish Government budget for flood management was included in this annual contribution in 2007. The use of these resources for flood management could be monitored through National Outcomes.

²⁴ 2009 Act, Part 3, Section 52.

3.4.1.2. The Selection of Rural Land Management Techniques

The 2009 Act emphasises the need to take a sustainable approach to flood management. The word “sustainable” for example appears seven times in the 2009 Act, including in the Extended Title, in the general duties, and in the selection of measures. Divergent views appeared during the legislative process of the 2009 Act about the degree to which principles of SFM should be set in statute (see Chapter 2). The Executive, for example, was of the view that the 2009 Act should set a framework, and allow flexibility in objective-setting and the selection of measures, rather than setting out the substance of what SFM should look like:

“While the Bill is intended to set the framework to ensure SFM, the legislation will not define SFM, or list possible measures. To do so would run the risk of creating an inflexible system that would be unable to adapt to changing pressures caused by climate change, or to utilise more up-to-date methods as our understanding of methods to manage flood risk develops” (SG, 2008, p. 30).

In contrast, environmental NGOs wanted to set out more stringent prescriptions:

“We wanted a lot of prescriptions on SFM but we were convinced by the Scottish Government that that was the way we should go. Often by having prescriptions in, you could actually end up binding yourself in what could be done. It’s much better to describe the outcome you want and then get to the detail in your guidance in how you get to that outcome” (WWF-Scotland, 17/11/2009).

Guidance on SFM requires responsible authorities to select the combination of measures securing the greatest long-term economic, social and environmental benefits. In particular, it requires the consideration of non-monetary costs and benefits in addition to economic ones (SG, 2011a). In parallel, as part of management planning at the district level, the 2009 Act requires SEPA to prepare maps of natural features the removal of which would significantly increase the risk of flooding²⁵, and to assess whether the alteration or restoration of natural features would contribute to the management of flood risk²⁶. Both are a direct link to rural land management techniques.

²⁵ 2009 Act, Part 3, Section 19.

²⁶ 2009 Act, Part 3, Section 20.

In interviews, environmental NGOs highlighted the importance of these assessments. In the short-term, assessments of non-monetary social and environmental benefits may increase the attractiveness of rural land management techniques. In the long-term, assessments of flood alleviation benefits may improve knowledge and increase confidence in their effectiveness. Other interviewees were more critical of rural land management techniques. The interviewee from the rural business association repeatedly stressed that techniques may have considerable economic impact on farming:

“Utilising floodplains for managing floods in a more natural way is not going to come for free. It creates capital and income losses for those using good agricultural land. If this is in the public interest then the public purse should be paying because it is private property” (NFUS, 08/10/2010).

When prompted during interviews, interviewees did not oppose the idea that land managers should be compensated for economic losses associated with rural land management techniques, but were concerned about the design of procedures compensating land managers (see Agricultural and Rural Development Policies).

For the interviewee representing local authorities' interests, rural land management techniques could complement flood defences by alleviating residual risks and could be valuable in the long-term to mitigate the impacts of climate change. However, the interviewee was sceptical of their effectiveness and preferred more established engineering measures rather than less well understood work on wetland restoration for flood alleviation. Several other interviewees discussed the perceived lack of enthusiasm of local authorities for rural land management techniques, and often described it as being a “cultural” tendency to favour engineering measures based on a lack of expertise in restoration work:

“Engineers don't tend to believe in Natural Flood Management and they were the people who ran the flood management systems. They do engineering solutions very well. If you talk to them about building more forestry, taking down some of the walls, big dykes, banks, oh no no no no. There's a kind of cultural problem inside local authorities” (MSP 1, 09/09/2010).

“SEPA has got a lot of environmental and hydrological expertise whereas local authorities tend to have more engineering experience. You need a new breed of flood engineers that will understand better catchment processes” (RSPB, 27/05/2009).

Debates on terminology further illustrate the different perspectives on rural land management techniques, not only as opposed to engineering techniques, but also with regards to different types of rural land management techniques. For instance, washland creation whereby water is stored artificially and temporarily on land may be perceived as relatively effective rural land management technique for flood alleviation by local authorities, while pro-restoration actors would still consider it as being on the engineering end of rural land management techniques.

As an interviewee from Scottish Natural Heritage (SNH) said:

“One of the ones that kept coming up that I was getting quite irritated by was this transverse woody strips using Sitka spruce. Just sent shivers down my spine! It's like using vegetation but in quite a technical way, it is engineered vegetation as opposed to a more natural, restoring processes but also restoring the character of a catchment as well. So I suppose it's the flood plain wetlands rather than wash-lands idea” (SNH 1, 11/10/2010).

Several research and pilot projects have been developed in Scotland to establish a better understanding of rural land management techniques. These include for example the WWF Natural Flood Management River Devon project (WWF, 2007), the Macaulay Institute (now James Hutton Institute) Tarland project²⁷ and the Scottish Borders Council River Craik project (Howgate and Kenyon, 2009), which have informed pre-2009 Act flood policy. The Scottish Government engaged in developing a research strategy to improve understanding of the effectiveness of rural land management techniques. The strategy originally aimed to identify knowledge gaps on the hydrological links between flooding and rural land management, how to fill these gaps through an appropriate monitoring strategy, and identify sites for pilot projects²⁸. A full research strategy failed to be developed, but was shortly followed by the setting up of two pilot projects: the Eddleston Restoration project (Werritty *et al.*, 2010) and the SEPA Allan Water project (SEPA, 2011a).

²⁷ Source: <http://www.macaulay.ac.uk/tarland/> (23/04/2011).

²⁸ Source: <http://www.sniffer.org.uk/> and <http://www.scotland.gov.uk/Topics/Environment/Water/Flooding/FRMAct/saif/NFMG> (02/11/2008).

Interviewees disagreed on the role of the research strategy in informing flood policy. Some challenged its purely scientific credentials and argued that the research strategy should have supported short-term implementation of rural land management techniques. One of the interviewees from environmental NGOs for example argued:

“Consultants wanted to reduce everything down to basic hydrological units and then work up from there. That would take 20 or 30 years. We have to have a better understanding of the risk and more awareness of the uncertainty. But we should also accept that there is some and go ahead anyway” (WWF-Scotland, 17/11/2009).

Interviewees supporting greater short-term implementation were of the view that the same approach should be taken as was done for Sustainable Urban Drainage Systems (SUDS), in that the lack of scientific evidence should not hinder adoption because of multiple social and environmental benefits. From a similar point of view, the SFM guidance argues that uncertainty about their effectiveness in reducing flood risk should not hinder the adoption of rural land management techniques (SG, 2011a). However, other interviewees were critical of moving too fast. As an academic observed, taking the same steps as for SUDS means policy sets the agenda for research:

“There are strong similarities between what happened with the enshrinement of Natural Flood Management in legislation and the enshrinement of SUDS. In both cases, a consensus emerged based on what well-meaning individuals regarded as common sense, and this consensus guided governmental legislation. The research then had to catch-up. All what research can do is to help people fine-tune implementation. My feeling is that the science was far from well developed when the decisions were put into law” (Academic 2, 30/09/2010).

By moving too fast with implementation, decision-making may not be based on reliable scientific evidence. The contrasting roles of research in informing flood policy on the issue of rural land management techniques is confirmed when examining stated aims of the two pilot projects currently supporting the implementation of the 2009 Act. The Eddleston Project aims to develop a restoration strategy associated with an extensive monitoring programme (Werritty *et al.*, 2010). Emphasis is on measuring the effectiveness of rural land management techniques, and therefore on building scientific evidence. The Allan

Water project aims to develop methodologies (to evaluate the effectiveness of rural land management techniques in alleviating flooding), to identify barriers and opportunities, and provide practical examples of rural land management techniques (SEPA, 2011a). In contrast to the Eddleston project, emphasis is therefore on delivery and implementation.

What this analysis suggests is that, while rural land management techniques are firmly anchored in the Scottish flood policy agenda, their integration in the planning process will depend on issues of costs, benefits and scientific evidence. The next sub-section discusses the integration of rural land management techniques in Scottish flood policy instruments.

3.4.1.3. Implementing Rural Land Management Techniques

The analysis of documents and interviews revealed two main flood policy instruments in Scotland: FPS by local authorities, and the set up of agreements between local authorities and individuals. They are examined in turn below.

FPS are the statutory vehicle for the development and implementation of flood management interventions. By making a link between the FPS procedure and the Acquisition of Land (Authorisation Procedure) Act 1947 (c.42), the 2009 Act gives local authorities the power to compulsorily purchase land for the operation of FPS when successful negotiation with landowners is not possible. Such powers could theoretically therefore be used for the implementation of rural land management techniques.

All interviewees believed that the use of coercive powers was not yet necessary, preferring voluntary approaches and economic incentives to encourage uptake. Expropriation was unlikely because of the lack of firm scientific evidence to legally justify a potentially socially controversial measure. In addition, expropriation might be prohibitively costly since it is likely that large swathes of land would need to be bought to have a meaningful impact on flood risk. The

example of SUDS was once more mentioned by several interviewees to suggest that guidance in the form of best practice should be used instead of regulatory instruments, at least until further scientific evidence on their effectiveness becomes available:

“We should get information into good practice document like for SUDS. In a few years, that would evolve into regulation documents when people have got into the habit of doing particular things. But it is difficult to regulate if you can’t tell people why you regulate; they want a proof of things” (SEPA 1, 24/04/2009).

The other instrument set out by the 2009 Act allows local authorities to set up agreements with any other person or organisation such as land managers, and contribute to expenditures and income lost arising from rural land management techniques²⁹. This should ensure that land managers are financially compensated. Payments may however need clearance from European institutions³⁰, but, most importantly, they may require profound changes in the organisation of local authorities’ budgets and the way they operate. Local authorities would ideally need to compensate land managers for lost income on an annual basis in return for delivering rural land management techniques. Payments would also need to be secured over a long time-scale, if not permanently, to provide continuous incentives. However, local authorities’ budgets typically have a short cycle (e.g. around 4-5 years), and are vulnerable to changes in political priorities. Maintaining yearly payments over long-time scale might therefore be impossible.

Overall, this sub-section has examined the nascent framework for integrated flood and rural land management in flood policy. Attention will now be turned to water policy, a policy area closely related to flooding which offers many opportunities for synergies in implementation.

²⁹ 2009 Act, Part 4, Section 56 (2)(d).

³⁰ State aid to the agricultural sector is strictly regulated by European laws. State aid may require formal approval of the European Commission, although exemptions may apply. There should not be double or combined funding with agricultural and rural development grant schemes. See: <http://archive.defra.gov.uk/foodfarm/policy/farm/state-aid/index.htm> (03/04/2012).

3.4.2. Water Policy

The overall objective of water policy in Scotland is set out in the Water Environment Water Services Act 2003 (the 2003 Act), transposing the EU WFD. It requires Good Status to be met for all water bodies by 2015 with time derogations possible up to 2027. Good Status is defined as reaching good ecological, chemical and morphological conditions for rivers, lakes and coastal waters. The 2003 Act includes a duty to promote SFM, added during the legislative process transposing the EU WFD. In flood policy, the duty encouraged the creation of a sub-group within the national flood advisory forum (see Chapter 2). In water policy, the results are more mixed. The following discusses how integrated flood and rural land management is embedded in the three main water policy procedures and instruments: water management plans, the Water Environment (Controlled Activities) (Scotland) Regulations 2005, and the Water Environment Restoration Fund (WERF).

The 2003 Act requires SEPA to prepare River Basin Management Plans (RBMPs) at district level and Area Management Plans (AMPs) at local level. The current objectives for RBMPs are to reach 98% of water bodies in Good Status in 2027 (from 68% in 2008) (SEPA, 2009). The main water issues identified in RBMPs include: pollution from agriculture and household sewage effluents, and morphological changes due to hydropower (impoundment) and agriculture (alterations to river bed and banks) (SEPA, 2009). By taking measures to improve the morphology of rivers and reduce pollution from agriculture, RBMPs may contribute to alleviating flood risk. Measures include for example reduced tillage, creation of buffer strips and wetlands, allowing space for rivers, removal of non-native conifers, and planting of native trees within the buffer zone (SEPA, 2009), all of which may have subsidiary benefits for flood alleviation.

With regards to the management planning process itself, RBMPs and AMPs must be developed, implemented and reviewed by SEPA with the collaboration of other responsible authorities and stakeholders. To do so, the 2003 Act requires the establishment of Advisory Groups at district and area levels. Planning processes

for flood and water policies have similar timetables, as required by the EU Floods Directive. The second round of RBMPs and AMPs in 2015 coincides with the first round of district and local FRMPs and all have a six year management cycle. In addition, spatial boundaries for district FRMPs are based on those for RBMPs. Planning processes may therefore represent opportunities for integration between flood and water management interventions. SEPA may have an increasing role in this regard because of its overall responsibility for the implementation of FRMPs under the EU Floods Directive and RBMPs under the EU WFD. The 2009 Act recognises this opportunity by requiring appropriate consistency and coordination between both planning processes³¹.

Some issues were nevertheless identified. First, boundaries for local FRMPs were likely to follow different boundaries than those for AMPs (see Flood Policy). Second, Good Status objectives in water policy are set at water body level while objectives in flood policy are based on assessments of Potentially Vulnerable Areas (see Flood Policy). Potentially Vulnerable Areas are unlikely to follow boundaries of water bodies. The result is the existence of multiple scales for management planning and objective setting that do not necessarily follow catchment boundaries or relate to each other. In its consultation document on planning processes for flood policy, SEPA recognises the difficulty of integrating local FRMPs with AMPs, and calls for integration “as appropriate” (SEPA, 2010a). As a consequence, integration between water and flood policies may face methodological issues, as well as challenges with regards to stakeholder engagement, in particular at the local level.

Another key policy instrument in water policy is Water Environment (Controlled Activities) (Scotland) Regulations 2005 (CAR) which sets in place a three-tier risk-based approach to regulating new works with the overall aim to prevent or minimise the deterioration of the water environment (SEPA, 2007). CAR covers the river channel, river banks, and any land that drains into water bodies. General Binding Rules are the lowest tier and require best management practices. Registration and licensing represent the second and third tiers. They require

³¹ 2009 Act, Part 3, Section 48.

notification of work, and the payment of a fee to SEPA. Licences require a higher degree of justification and are more costly than registrations.

Table 3.3 presents activities with potential flood risk impacts regulated by CAR, and those that are explicitly excluded. Flood defences used in flood management, such as the building of flood walls, dredging, the reinforcement of river banks, or the creation of impoundments, currently require SEPA's authorisation. CAR user guidance suggests that soft-engineering techniques should be used to minimise the environmental impact of flood defences. Alternative techniques, such as rural land management techniques, should be used when they can provide the same degree of flood risk benefit (SEPA, 2007). The analysis of documents and interviews revealed however two main issues with CAR.

Table 3.3 - Activities with potential flood risk impact regulated under the Controlled Activities Regulations

Activities	CAR	Flood risk dimension
Maintenance of existing structures including floodwalls and walls on rivers and lochs.	Do not require authorisation.	Maintain local protection, maintain increased downstream flood risk.
Removal of instream and riparian vegetation, debris, inland wetlands, land drainage works not affecting watercourse, road drains.	Do not require authorisation.	Increase water run-off, may reduce local flood risk, may increase downstream flood risk.
Cultivation of land (e.g. 2m buffer strips).	General Binding Rules.	Reduce water run-off, may reduce downstream flood risk.
Keeping of livestock (e.g. poaching).	General Binding Rules.	Lower erosion, may reduce downstream flood risk.
Diversions, by-passes, realignment and culverting.	Licences.	Modify in-stream water flow and sediment transport with varying impact on flood risk.
River bank reinforcement (e.g. re-profiling, embankment, flood walls) and construction or operation of impoundments.	Various levels of control depending on risk for the water environment.	Contain in-stream water flow, may increase downstream flood risk. Impoundments may decrease downstream flood risk if managed to create water storage when flooding predicted.
Sediment management (e.g. dredging) and construction of in-stream structures (e.g. boulders, bridges).	Various levels of control depending on risk for the water environment.	Increase and contain in-stream water flow, may increase downstream flood risk.
Other engineered activities including construction of buildings and developments.	Various levels of control depending on impact on water environment and flood risk.	May increase local and downstream flood risk.

First, current procedures in CAR seem ill-equipped to regulate the impacts of flood defences on flood risk at catchment level. Activities such as the removal of in-stream and riparian vegetation, the draining of inland wetlands and land, or the maintenance of road drains do not necessarily require CAR authorisation³² (SEPA, 2007), but, cumulatively, they may exacerbate flood risk by accelerating in-stream flow and reducing water retention on land. CAR authorisations themselves are based on individual activities, and the cumulative impact of individual activities is not necessarily taken into account. Performing several General Binding Rules or registration level activities, such as small scale river bank reinforcement on a single watercourse, may result in significant impacts on water flow. This issue was raised by the SNH interviewee in relation to the impacts of low risk activities on protected sites for biodiversity:

“SEPA focuses on applications they consider to be highest risk. Issues particularly arise with cumulative action at registration level that SEPA tend to be quite relaxed about but SNH is not. Particular activity could be fine but not if it's on top of others” (SNH 1, 11/10/2010).

Second, using CAR to reduce the use of flood defences and encourage rural land management techniques may meet with significant opposition by rural businesses. Submissions by the National Farmers Union Scotland during consultations for RBMPs and the legislative process for the 2009 Act called for minimal regulations, in particular with regards to the maintenance of rivers through dredging and river banks improvements, in order to safeguard agricultural production (NFUS, 2009). The interviewee from the rural business association highlighted the disproportionate impact of CAR on rural businesses:

“The big problem is where farmers are not able to manage the river as they have done in the past because of CAR. It has created a sense of concern for farmers in that they cannot protect their land in the same way they used to do. The regulations do not recognise agriculture properties in the same way they recognise domestic properties. A house can be protected from flooding but not agricultural land although farmers earn their income from the field and land has a capital value” (NFUS, 08/10/2010).

The final component of water policy relevant to integrated flood and rural land management is the WERF. Set up by SEPA in 2009, it encourages the restoration

³² Some activities such as large drainage works and creation of road drains may require an Environmental Impact Assessment which assesses their impact on flood risk.

of the water environment (as opposed to CAR which aims to prevent its deterioration). It is a competitive fund and any organisation and individuals can apply to it. Guidance for the application process specifies that projects with multiple environmental, social and economic benefits will be given higher priority. Selection criteria include flood alleviation benefits³³. The WERF has started to fund projects that may include subsidiary benefits for flooding, such as the Eddleston project.

Closer examination of documents suggests that WERF might, in the short-term, be of limited use for integrated flood and rural land management. The budget for the WERF is small (£1 million a year)³⁴ and is thus highly competitive. Guidance on the selection process stipulates that, currently, 45% of the fund is targeted towards projects that meet RBMP priority actions, principally the removal of barriers to fish migration and the delivering of restoration in priority catchments affected by diffuse pollution and morphological pressures³⁵. Projects with the greatest ecological and morphological benefits to meet 2015 EU WFD objectives are likely to be prioritised over those whose primary aim is flooding alleviation.

Overall, water policy may provide vehicles to promote catchment flood management and rural land management techniques for flood management. However, ecological improvements may be prioritised over flood alleviation, in particular in a context of limited resources and opposition from land managers. The next sub-section addresses agricultural and rural development policy, a policy area which has been the centre of much attention in relation to flood policy in Scotland.

³³ Source: www.sepa.org.uk/water/restoration_fund/detailed_funding_information.aspx (06/07/2011).

³⁴ Source: www.sepa.org.uk/water/restoration_fund/detailed_funding_information.aspx (06/07/2011),

³⁵ 100 catchments across Scotland have been identified as requiring a catchment approach for reducing impacts of diffuse pollution. 14 catchments were prioritised in the first cycle of RBMP (2009-2015).

3.4.3. Agricultural and Rural Development Policies

The EU Common Agricultural Policy (CAP) is the overarching policy framework for agriculture in Scotland. The so-called Pillar 1 of the CAP provides direct subsidies from the European Union through the Single Farm Payment (SFP). Scottish land managers may receive about €4 billion through the SFP over the funding period (2007-2013) (Marsden, 2011). Pillar 2 is paid out through the Scotland Rural Development Programme (SRDP), a broad programme of measures targeted at rural businesses and communities. The SRDP represents about €680 million of EU funding co-financed by the Scottish Government to a total of €1.4 billion over the funding period (2007-2013) (Marsden, 2011). Key administrative bodies for agricultural and rural development policies in Scotland are the Scottish Government teams for agriculture and rural development, and the Rural Payment and Inspections Directorate (RPID) which processes payments under the CAP. SNH and Forestry Commission Scotland (FC-Scotland) are also closely involved, in particular through the SRDP (see Natural Heritage and Forestry Policies). Two national groups composed of a wide variety of stakeholders (including the corporate sector and civil society) currently supervise the CAP. The Future CAP Stakeholder Group offer advice to the Scottish Government on the implications for Scotland of proposed European reforms. The design and delivery of the SRDP is overviewed by a Programme Monitoring Committee.

The CAP and the SRDP were widely seen by interviewees as a powerful vehicle for encouraging integrated flood and rural land management. However, the analysis of documents and interviews suggests that this potential may be limited in practice. This sub-section examines the role of the CAP and the SRDP in encouraging rural land management techniques for flood alleviation.

With regards to the CAP, the SFP is decoupled from production and currently based on historical payments to individual land managers between 2000 and 2002 (Marsden, 2011). Land managers must in return comply with 16 Statutory Management Requirements (SMRs) and 19 Good Agricultural and Environmental

Conditions (GAEC), a requirement known as cross-compliance. SMRs are based on statutory requirements from existing EU Directives (e.g. on animal welfare, environmental protection, etc), while GAECs represent additional measures (SE, 2006a). SMRs and GAECs are targeted to respond to a wide spectrum of agricultural issues and related issues, from animal health to environmental matters. Measures include maintaining good soil conditions or protecting, to some extent, rough grazing, semi-natural areas and field boundaries, all of which may reduce water run-off.

However a closer examination of the SFP suggests counter-productive rules. To be eligible, land must be maintained in productive condition, and rules apply with regards to the maximum allowable density of natural features (e.g. trees, shrubs). These rules may encourage land managers to remove them, thus reducing the capacity of agricultural land to retain and slow run-off. Given the incentive to remove natural features, they may also work against effective implementation of SMRs and GAECs (see e.g. Beaufoy *et al.*, 2011). In addition, only GAEC 5 “Maintenance of Functional Field Drainage Systems” currently explicitly mentions flood alleviation in the associated guidance (SE, 2006a), but in doing so, requires drainage maintenance to minimise the risk of flooding on agricultural land, instead of encouraging the retention of water. A Scottish Government discussion paper examining opportunities for integrating flood management into cross-compliance suggested that, while many GAEC measures can have positive impacts for flood alleviation, GAEC 5, 15 “Field Boundaries” and 18 “Encroachment of Unwanted Vegetation” need to be altered to ensure positive synergies (SAIFF, 2011). Using CAP to promote rural land management techniques would therefore require further reform of the rules on eligibility, SMRs and GAEC. Powers in this regard are mostly held at European level (i.e. eligibility and SMRs), although some leverage exists at the Scottish level through GAECs.

The SRDP has five main objectives: 1) improved business viability, 2) enhanced biodiversity and landscape, 3) improved water quality, 4) tackling climate change, and 5) thriving rural communities (SG, 2007b). The latest programme (2007-2013) now not only targets land managers but also rural communities by

integrating other European and national schemes, such as the LEADER programme³⁶. Three SRDP schemes have the strongest influence on rural land management: the Less Favoured Area Support Scheme (LFASS), the Land Managers Options scheme (LMO) and the Rural Priority scheme (RP). The LFASS is primarily a support scheme for less agriculturally productive areas and does not encourage environmentally friendly land management. Land managers are entitled to LFASS on the basis of their location in Scotland. In contrast, land managers must apply on the basis of individual projects to obtain LMO and RP grants. While each land manager is entitled to a capped total of LMO grants, they must compete to obtain RP grants. The LMO and RP schemes are designed to encourage land management that meets one or preferably several of the five main priorities of the SRDP. As of 2010, the budget for LFASS was about £393 million, while the budget of the RP and LMO schemes for environmentally-friendly agricultural land management, known as agri-environment measures, was £336 million, and for forestry measures £297 million (Rural Development Company, 2010).

Because flood management is a target within the Tackling climate change objective of SRDP, the SRDP is a potential avenue for encouraging the uptake of rural land management techniques for flood management. The analysis of documents and interviews suggests nevertheless three main problems with using the LMO and RP schemes to encourage flood management measures: 1) inadequate objectives, 2) low levels of compensation over short timescales, and 3) inadequate targeting. They are examined in turn.

First, one LMO out of 25, and six RPs out of 75 include flood management as an objective (Table 3.4), including one RP (RP 22) with flood management as its main objective. In comparison, water quality improvement is better represented. It is one of the SRDP's five main objectives, five LMOs include water quality as an objective, and 13 RPs have water quality as a top objective. Other LMOs and RPs may nevertheless have subsidiary benefits for flood management. For example,

³⁶ LEADER stands for « Liaison Entre Actions de Développement de l'Économie Rurale », and is one of the European structural funds. Source: http://ec.europa.eu/agriculture/rur/leaderplus/index_en.htm (10/01/2012).

RP 40 “Arable Reversion to Grassland” does not include flood management as an objective, but may help create water storage areas or reduce water run-off by increasing surface roughness. RPs may need repackaging to better prioritise flood management. The Scottish Government discussion paper recommended that, once FRMPs are prepared, the implementation of FRMPs could be added to SRDP objectives (SAIFF, 2011). It suggested the re-targeting of 18 existing RPs to complement the seven RPs that already have flood management as an objective, as well as the addition of new RPs to better promote flood management (SAIFF, 2011).

Table 3.4 - List of rural priorities where flood management is an objective

Rural Priorities	Management of Wetlands (RP 18)
	Create, Restore and Manage Wetlands (RP 19)
	Management/Restoration of Lowland Raised Bogs (RP 20)
	Water Margins and Enhanced Riparian Buffer Areas (RP 21)
	Management of Flood Plains (RP 22)
	Grass Margins and Beetle Banks (RP 35)

Second, interviewees repeatedly pointed out that the SRDP did not provide the levels of compensation, or the timescale required to secure land managers’ interest and secure long-term flood alleviation benefits. The Scottish Government discussion paper recommended a re-assessment of compensation levels and timescales of RPs (SAIFF, 2011). Excluding rates for capital expenditures (e.g. fencing, planting trees), levels of compensation to the land manager in RP 22 “Management of Floodplain” are indeed low, at only £39 per hectare per year (SG, 2007b) compared to other options such as £111 per ha per year for biodiversity-friendly grazing regimes and £222 per hectare per year for mixed woodland planting³⁷. Ideally, rural land management techniques should be a permanent feature in order to provide long-term flood alleviation. Compensation should therefore be continuous or at least longer term to maintain protection. Apart from the question of cost-effectiveness (e.g. how cost effective is a measure that must be paid for on a continuous basis), this poses the problem of financial

³⁷Source: <http://www.scotland.gov.uk/Topics/farmingrural/SRDP/RuralPriorities> (03/06/2011).

sustainability (e.g. how to maintain payments across agri-environment agreements which are currently limited to five years). There was wide agreement amongst interviewees that the SRDP was already under-resourced. An interviewee from one of the environmental NGOs for example stated:

“You know SRDP cannot achieve everything, there is not enough money so it is definitely not the only answer” (RSPB, 27/05/2009).

Further integration of flood management into the SRDP may require additional funding, a reallocation of funding towards flood management objectives, or better design and targeting of LMOs and RPs in order to meet several objectives for the same compensation levels.

Third, the design of procedures for applying for LMO and RP grants suggests that agreed projects may be poorly targeted to be effective in managing floods. Currently, land managers must develop their own project, and apply individually to the schemes. A Statement of Intent must first be sent; once accepted, a full application must be developed. The evaluation of Statements of Intent and full applications is carried out by case officers working for RPID, SNH and the FC-Scotland. Case officers can suggest modifications to the project through the Statement of Intent in order to improve the design of the full application and its potential success. Some RP applications must also go through a collective decision making process between the three organisations which meet through Regional Proposal Assessment Committees (RPACs). 11 RPACs were set up at a local level in Scotland. They are in charge of setting which priorities RPs must achieve in their region. Case officers and RPACs can therefore in theory influence the design of land managers' projects by setting priorities locally and suggesting changes to applications. In practice, case officers and RPAC must follow the scoring system and budgetary envelopes for each SRDP priorities set by the National Proposal Assessment Committee. This latter committee therefore has a significant influence on the success of individual applications.

Three reviews carried out by independent consultants (Cook, 2009; Rural Development Company, 2010) and the Royal Society for the Protection of Birds (RSPB, 2011) suggest that these procedures result in poorly targeted projects.

Underpinning issues include the complexity of the scoring system, ineffective monitoring of RP applications, and the lack of local control on individual applications. Both reviews suggested greater targeting through smaller scale assessments (e.g. ensure greater targeting at farm holding level instead of landscape priorities), greater support for case officers (e.g. training and time to do farm holding visits), and greater levels of autonomy for RPACs (e.g. financial control over budgets, capacity to change priorities as local needs arise). Some of these issues were reflected in interviews. Several interviewees had the following criticism on RP 22, for example:

“Applications are never done in a planned way. It is up to the farmers to decide themselves to do something about flooding and it may not necessarily be in an area that would have any effect on flooding” (WWF-Scotland, 17/11/2009).

RP 22 was also criticised for excluding semi-natural floodplain habitats (and therefore much of Scotland’s historically modified floodplains), and the rules on collaboration between land managers which require consent of all floodplain landowners even when they may not be impacted by the measure. The Scottish Government discussion paper also highlights those issues and recommends changes to the wording of the options (SAIFF, 2011).

This sub-section has shown that agricultural and rural development policies consider flood management to a limited extent. Fostering more integration is likely to face considerable barriers as policies try to meet the multiple challenges faced by rural communities. Further comments were provided by interviewees with regards to natural heritage and forestry policies for which the SRDP is also one of the main policy instruments. These policies are examined in the next sub-section.

3.4.4. Natural Heritage and Forestry Policies

Natural heritage and forestry policies are examined in the same sub-section because they provide interesting similarities and contrasts. Natural heritage policy in Scotland is built around the Scottish Biodiversity Strategy (SE, 2004a). The

overall aim of the Strategy is to maintain and enhance the natural heritage of Scotland. Key organisations include SNH and national parks. Forestry policy is governed through the Scottish Forestry Strategy, the overall aim being to improve the lives of people through the benefits of woodlands and trees (SE, 2006b). The key organisation is the Forestry Commission, operating across Great-Britain (includes England, Wales, and Scotland –but not Northern Ireland). Its Scottish branch, the FC-Scotland, is funded through the UK and the Scottish Governments, and fees from felling licences³⁸ (SE, 2006b). The following examines the support for integrated flood and rural land management in: 1) overarching strategies, 2) regulatory mechanisms, 3) economic instruments, and 4) decision-making procedures.

Flooding is a recurrent theme in several documents related to natural heritage and forestry policies. Earlier natural heritage policy documents (SE, 2004a) describe links between flood management and habitat loss while more recent documents (SNH, 2009b; 2009d; 2009f) describe the role of rural land management techniques in encouraging the restoration of habitats. The concept of ecosystem services is also mentioned, with references to the role of natural habitats in regulating flood waters (SNH, 2009a). Similarly, the Scottish Forestry Strategy (SE, 2006b) makes links with catchment management, SFM and climate change adaptation. Some documents nevertheless do not make links with flood management, such as the SNH Natural Heritage Futures on Farmland which sets out SNH policy in farmed areas and does not mention flood management (SNH, 2009e). Similarly the Scottish Forestry Strategy does not include any indicator linked to flood management (FC, 2010).

In terms of regulatory instruments, SNH and FC-Scotland can influence the authorisation and design of economic developments through Environmental Impact Assessments (EIAs). EIAs are required for human activities that may impact important habitats and species, or for large felling activities. EIAs have the potential to encourage the uptake of rural land management techniques by requiring the evaluation of development impacts on environmental processes and

³⁸ Most felling activities must be authorised by FC Scotland. Exemptions apply (FC, 2007).

hazards, including hydrology (FC, 2009b; SNH, 2009c). If the proposed development impacts significantly downstream flood risk, SNH and FC-Scotland can, in theory, ask for mitigation measures.

More specifically on natural heritage policy, the UK Biodiversity Action Plan, prepared under the UN Convention on Biological Diversity, has identified 65 priority habitats and 1,149 priority species requiring conservation action (DEFRA, 2007a). In addition, specific sites are protected for their biodiversity value. These include Special Protection Areas (SPAs) set up under Council Directive (79/409/EEC) on the Conservation of Wild Birds, Special Areas of Conservation (SACs) set up under Council Directive (92/43/EEC) on the Conservation of Natural Habitats and of Wild Fauna and Flora, and Sites of Special Scientific Interest set up under UK legislation and the Nature Conservation (Scotland) Act 2004. Many priority habitats, species and protected areas are aquatic and terrestrial habitats, such as bogs and wetlands that may contribute to alleviate flooding. The Nature Conservation (Scotland) Act 2004 places a duty on all public bodies to further the conservation of biodiversity, which may further encourage the protection and restoration of priority habitats and species, and protected sites. Finally, human activities that impact designated species and habitats in protected sites require authorisation by SNH. In such cases, SNH can also impose specific land management measures on land managers through Land Management Orders. However, authorisations and Land Management Orders must currently be based solely on the protection of designated features, and not the consideration of side-benefits such as flood alleviation benefits.

By contrast, forestry policy is not underpinned by a general duty on public bodies, but by a mix of legal requirements and guidance regarding forestry practices set out in the UK Forestry Standard and Guidelines (FC, 2011a), and managed by the FC-Scotland. UK Forestry Standards are legal requirements on forestry practices based on international conventions, and European and UK legislation, while the Guidelines include best practice for sustainable forest management. The UK Forestry Standard and Guidelines is divided into more specific guidance on the relationship between forestry and 1) biodiversity, 2) climate change, 3) historic

environment, 4) landscape, 6) people, 7) soils, and 8) water. Flooding and flood management appear regularly in the different documents describing the UK Forestry Standards and Guidelines, including the overview (FC, 2011a), and more specific guidance on biodiversity, climate change, soils, and water (FC, 2011b; 2011c; 2011d; 2011e). Forestry practices are seen as having an influence on hydrological flows. Impacts of deforestation on run-off should be minimised. Protecting existing forests and woodlands (in particular wet woodland), and afforestation are encouraged where they can create floodplain water storage, run-off control, and mitigate climate change impacts. None of those principles are however legal requirements (i.e. Forestry Standards), but are set as best practice (i.e. Guidelines).

Most funding for the maintenance and restoration of protected and forested areas is channelled through the SRDP, and is not within the strict control of SNH and FC-Scotland. SNH and FC-Scotland (together with RPID) co-manage the assessment of RP applications in particular when they have, respectively, a natural heritage or forestry component³⁹. Since May 2011, SNH may approve on an ongoing basis RP applications which target the management of SNH protected sites, and where the total value of the project does not exceed £50,000. Similarly FC-Scotland may approve applications on an ongoing basis when they have a forestry component, target the improvement of forested landscapes or carbon sequestration, and when the total value of the project is below £750k for woodland creation and £250k for woodland management (SG, 2011c). The ongoing procedure gives some control to SNH and FC-Scotland on the assessment of applications, and therefore on the final agreement.

Interviewees pointed out nevertheless that, because most of the initiative for applying for LMO and RP grants for biodiversity and forestry is placed foremost on land managers (see Agricultural and Rural Development Policies), SNH and FC-Scotland may have little opportunity to target incentives appropriately in the landscape. This lack of control is recent and related to the SRDP 2007-2013

³⁹ Source: <http://scotland.gov.uk/Topics/farmingrural/SRDP/RuralPriorities/HowItWorks> (03/06/2011).

which was the first attempt to pool land management grant schemes together. Previously, individual organisations (e.g. RPID, SNH, FC-Scotland) administered their grant schemes independently. Interviewees therefore pointed out that more recent changes giving greater control to SNH and FC-Scotland of RP applications was a response to the search of an adequate balance between the integrated approach sought by the SRDP 2007-2013, and the need for individual organisations to target land management changes in order to fulfil statutory objectives in natural heritage and forestry policy. Given the limited control of SNH and FC-Scotland over the targeting of SRDP funding in the landscape for their own policy objectives, natural heritage and forestry policies seem poorly equipped to financially encourage targeted rural land management techniques for flood management. It also suggests that use of the SRDP for flood management requires the involvement of organisations responsible or closely interested in flood management in the RP selection process in order to have effective targeting of applications. SEPA and local authorities could in theory act as such organisations because of their role under the 2009 Act and their existing involvement in RPACs.

So far, results suggest that biodiversity and forestry policies have many links with integrated flood and rural land management in terms of objectives, but less so in procedures and instruments. To improve the targeting of natural heritage and forestry policies and their coordination with other policies such as flood management, SNH and FC-Scotland work in partnership with other organisations through several stakeholder groups. The UK and Scottish Biodiversity Strategies are taken forward, at national level, by the Scottish Biodiversity Forum and its national Ecosystems Groups, and, at local level, by Local Biodiversity Action Groups. Similarly, the national Scottish Forestry Forum and Regional Forestry Fora act as stakeholder platforms for the Scottish Forestry Strategy. SNH and FC-Scotland are also part of Scotland's Environment and Rural Services (SEARS) which aim to improve coordination of regulatory agencies⁴⁰ on their interactions

⁴⁰ Public bodies involved in SEARS include: Animal Health and Veterinary Laboratories Agency, Cairngorms National Park Authority, Crofters Commission, FC Scotland, Loch Lomond and the Trossachs National Park Authority, SEPA, RPID and SNH.

with land managers. Natural heritage and forestry policies can therefore be informed by other policy actors, such as those involved in flood management.

In that regard, natural heritage and forestry policies differ widely in the level at which negotiations and decisions are taken. Natural heritage policy has a strong European component with legislation such as the Birds and Habitats Directives. It is then mostly managed at the Scottish level through the Scottish Government, SNH and the Scottish Biodiversity Forum. Further policy developments towards integrated flood and rural land management may therefore depend on policy developments both at European and Scottish levels. In contrast, forestry policy sits largely in a Great-British context led by the FC with little to no European legislation on the matter. For example, the UK Forestry Standards and Guidelines were developed for the whole of Great-Britain (FC, 2011a). Further policy developments towards integrated flood and rural land management in forestry policy may therefore be more dependent on policy developments at UK level.

3.5. DISCUSSION

Table 3.5 synthesises the degree of attention to integrated flood and rural land management observed in reviewed policies. Flood policy now recognises the value of catchment flood management and rural land management techniques, and sets out regulatory and economic instruments to encourage future uptake. However, complex environmental, social and economic interactions, and trade-offs between flood and rural land management have not yet been fully developed into complete and coherent problem representation and policy objectives. Also, methodologies and policy instruments need to be further developed to adequately consider integrated rural land management techniques in decision-making, and implement them in practice.

Table 3.5 - Degree of attention to integrated flooding and rural land management in policies reviewed. *Blank: no reference; X: occasionally considered; XX: integrated*

Policies	Problem representation	Objectives	Instruments
Flood	X	X	X
Water	XX	X	X
Agriculture			
Rural development		X	X
Natural heritage	XX		
Forestry	XX	X	X

Implementation of rural land management techniques for flood alleviation could benefit from other policies and their instruments (Gunningham and Sinclair, 1998). Water policy has for example a strong regulatory framework on land managers through CAR, while agricultural and rural development policies have a well-developed system of payments to land managers through the SFP and the SRDP. Natural heritage and forestry policies offer a mix of regulatory (e.g. EIAs, protected areas, licensing) and economic instruments (e.g. SRDP). On the one hand, some degree of policy integration was identified. Water, natural heritage and forestry policies have started to include ideas of integrated flood and rural land management. Water and forestry policies have, to a certain degree, gone a step further by “flood-proofing” guidance documents and assessment criteria influencing decision-making. Rural development policies now include some incentives encouraging rural land management techniques, and, given its scope for a broader, more holistic approach by focusing on the “rural world”, the SRDP could include, in the future, priorities for flood management. On the other hand, reviewed policies are still anchored in stand-alone regimes, prioritising different problems and objectives. Some policies are issue-specific (e.g. water, natural heritage); others focus on individual economic activities (e.g. agriculture, forestry). In particular, integrated flood and rural land management remains nearly non-existent in Scottish rural development policy, and absent from agricultural policy.

These findings suggest that little has changed since the work of Gonzales (2006) and Kenyon (2007) who highlighted the poor integration of SFM into Scottish agricultural and rural development policies. The findings of this research extend these latter works by examining more closely water, natural heritage and forestry policies, which all appear to have limited regard to integrated flood and rural land management at the level of policy instruments. Overall, findings confirm, in the case of Scotland, the observation of Everard *et al.* (2009) that existing regulatory framework and incentives are inadequate for integrated, ecosystem-based flood management. However, they also suggest a greater degree of integration than Gilvear *et al.* (2010) study implies for catchment-wide river restoration (one type of rural land management technique) because, despite the lack of an “integrated strategy”, reviewed policies support individually, to some degree, integrated interventions.

Table 3.6 synthesises the distribution of responsibilities amongst organisations for the policies reviewed. The Scottish Government clearly has an overview role across policies, while local authorities and agencies have more specific roles. Instead of creating new bureaucracies, such as river basin organisations, Scotland has opted for a collaborative approach between existing organisations to achieve policy objectives, in line with the current trends in public policy (Persson, 2004; Howlett, 2009), IWRM (Mitchell, 2005) and flood management (Everard *et al.*, 2009).

Table 3.6 - Main responsibilities in reviewed Scottish policies related to integrated flood and rural land management

Organisation	Flood policy	Water policy	Agricultural policy	Rural development policy	Natural heritage policy	Forestry policy
Scottish Government	X	X	X	X	X	X
Local authorities	X					
SEPA	X	X				
SNH				X	X	
FC-Scotland				X		X

Briassoulis (2004) suggests that horizontal mechanisms, such as advisory groups, can help improve policy integration and strengthen collaboration. In Scotland, advisory groups to support collaboration are a common feature in all reviewed policies. Findings reported in this Chapter (as well as in Chapter 2) indicate that attempts to increase collaboration between policy actors involved in reviewed policies in Scotland have resulted in some information exchange and partnership-working, but it has failed to foster consensus and close collaboration. These results are coherent with other research in Scotland (Fish *et al.*, 2009) as well as in other contexts (Mollinga *et al.*, 2007; Ferreyra *et al.*, 2008). Three main challenges to collaboration are identified from the findings presented in this Chapter: 1) limited evidence of the effectiveness of rural land management techniques, 2) the nested nature of policy regimes, and 3) the lack of leadership and resources. They are examined in turn.

The lack of scientific evidence on the effectiveness of rural land management techniques has been a long-term stumbling block between opposing parties (i.e. flood engineers and environmental NGOs). This is exacerbated by a lack of adequate methodologies to manage associated uncertainties and accompany decision-making, and opposition from interested stakeholders, such as land managers. These results support findings from Gonzales (2006) regarding barriers to SFM in Scottish flood management. More theoretically, they recall the observation of Howlett (2009) that policy reforms are constrained by a system of rules, beliefs, values, and interests.

Findings in this research suggest that effective collaboration may be constrained by the “nested” nature of Scottish advisory groups. Scottish advisory groups must feed into separate policies; they may therefore only encourage some, but not full, cooperation because the main objective driving exchange and negotiation revolves around the parent policy objectives. They do not provide the context in which stakeholders realise inter-dependence, search for a balance between multiple benefits and ensure greater commitment for co-management (Neef, 2009; Watson *et al.*, 2009). This is exemplified by the long-term difficulties faced in integrating flood management into water policy, or the tensions appearing in RPACs with

regards to the control of SNH and FC-Scotland over natural heritage and forestry incentives. Overall, these observations fit suggestion from Howlett (2009) that policy nesting can hinder policy integration.

Findings in this Chapter suggest that integrated flood and rural land management in Scotland faces particular opposition by agricultural policy actors. Implementation may therefore require political commitment for further policy integration. Past research suggests that leadership is a critical requirement for successful IWRM. One of the core arguments for the creation of river basin organisation is their capacity to take this leadership (Hooper, 2003). In addition, Jordan and Lenschow (2010) observe that implementing policy integration requires strong political commitment in order to provide the necessary legitimacy to re-distribute policy benefits and costs, and assign funding for reforms. The absence of a single organisation fully responsible for flood management and with a particular interest in implementing rural land management techniques may become the biggest challenge for the implementation of integrated flood and rural land management.

In that context, five mechanisms in Scottish policy were identified as potentially fostering further policy integration (Figure 3.4). These mechanisms are examined below, and compared to ideas from the adaptive governance literature.

First, partnership-working for research, pilot projects, developing assessment methods and guidance are frequently used in policies reviewed as a basis for testing ideas, exploring their social-ecological implications, and identifying best practice. Methods for assessing costs and benefits of rural land management techniques, and their distribution amongst social actors may help improve comparability with other flood management measures, and clarify trade-offs (Johnson *et al.*, 2007; Everard *et al.*, 2009). Such collective activities between responsible authorities and stakeholders support the suggestion in adaptive governance that experimentation and learning must underpin interactions between policy actors (Folke *et al.*, 2005).

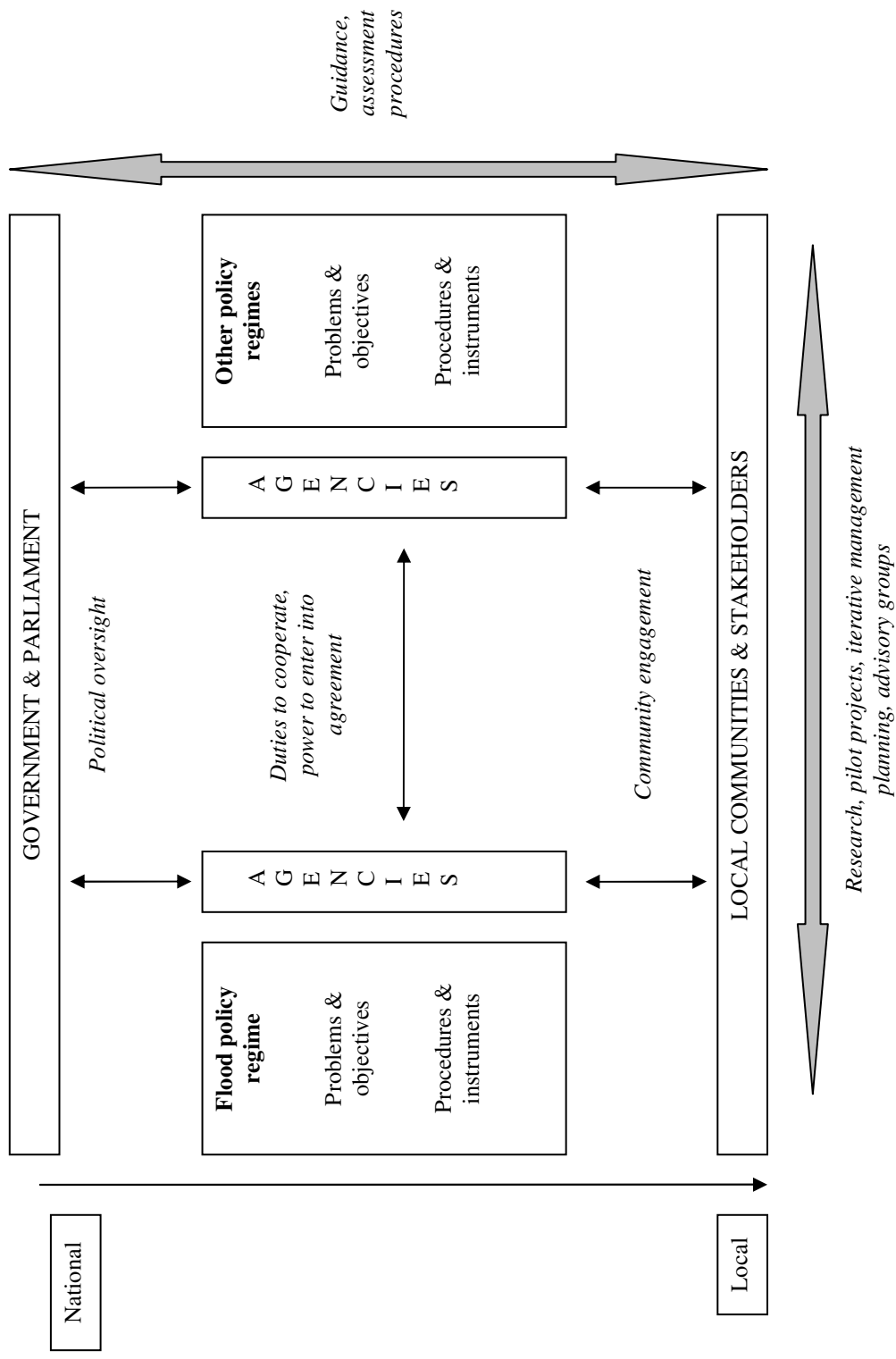


Figure 3.4 - Mechanisms fostering policy integration identified in Scottish flood policy

Experimentation can be associated to a “research” or a “management” strategy where the respective objectives are to inform policy-making, or to treat policies as experiments in themselves (Huitema *et al.*, 2009). For example, national advisory groups such as NTAG, FIAC and SAIFF performed research experimentation by testing ideas for integrated flood and rural land management through a series of scoping and research activities. However, these groups had limited influence on policy integration itself. Also, some of these activities appear driven by interest-groups to influence policy (e.g. WWF Devon Project) (see also Chapter 2).

In comparison, the Eddleston and Allan Water projects are both exemplars of a more managerial approach to experimentation, although with distinctive objectives and impacts. The Eddleston project appears more focused on building long-term hydrological evidence while testing adequate implementation strategies with local stakeholders. The Allan Water project’s emphasis is on building methodologies for the delivery of the 2009 Act. Following Vreugdenhil *et al.*’s (2010) classification of water pilot projects, the Eddleston project would appear more “holistic” in nature, driven by a philosophy of learning-by-doing and reflection on practice, while the Allan Water project would be more “analytical”, in that it is used to test and apply a particular approach to delivery in a local context. The scope for testing innovations is therefore likely to be greater in the Eddleston project, although possibly with less influence than the Allan Water project on immediate decision-making.

Second, management planning in reviewed policies is based on the idea that policy should be periodically re-assessed in order to provide an opportunity to re-frame problem construction, objectives and instruments according to new information and new context. This is a recurrent theme in the adaptive governance literature which calls for iterative cycles of policy formulation and implementation (Medema *et al.*, 2008; Huitema *et al.*, 2009). In the case of flood and water management planning (e.g. FRMPs and RBMPs), policy cycles were synchronised in order to encourage integration. As discussed earlier, findings suggest also that reforms should occur simultaneously at different levels of the

policy regime, a result coherent with Howlett (2009) on the difficulties to reform policies because of their nested nature.

Third, there is much emphasis in the reviewed policies on collaboration, perhaps more so with more recent pieces of legislation, such as the 2009 Act. The SFM guidance is particularly strong on the theme of collaboration, and includes detailed good practice guidance (SG, 2011a). More significantly, statutory instruments through duties and powers in the 2009 Act were thought necessary to frame and strengthen collaboration. The adaptive governance literature puts great emphasis on the importance of collaboration (Folke *et al.*, 2005; Huitema *et al.*, 2009), but often argues that informal means are most conducive to collaboration (Pahl-Wostl, 2009). However, as Sproule-Jones (2002) observes, creating an inclusive process and inter-dependence between organisations may improve the success of policy formulation and implementation. The Scottish experience suggests that a combination of statutory requirements and strong guidance may be necessary to frame participative processes, at least between authorities and agencies in order to strengthen collaboration.

Fourth, findings in Chapter 2 indicated that political oversight of policy processes may support greater responsiveness to societal issues, especially when particular events, such as floods, raise political awareness. In this Chapter, it was observed that the 2009 Act requires Parliamentary overview of implementation, with the hope that this procedure brings political attention to flooding issues, opens time for debate on a regular basis, and builds political support for greater implementation. No similar system however is built in at the local level since the membership of advisory groups is based on responsible authorities and interested stakeholders, with little direct oversight by local elected officials and limited involvement of the community in the decision-making.

Fifth, instead of working through fragmented policy regimes, integrated flood and rural land management can build on an unifying new whole. The SRDP is an example of such attempt (with its limitations as observed earlier) for the rural environment. Other unifying strategies currently being developed in Scotland are

the Climate Change Adaptation Framework (SG, 2009a) and the Land Use Strategy (SG, 2011b). Currently, these strategies work on the basis of policy recommendations rather than setting out new statutory objectives or policy instruments, the purpose being to act as roadmaps and suggesting avenues for change in sector-based policies. From an adaptive governance perspective, such voluntary planning procedures are seen as having a beneficial role for coordination. It remains to be seen whether they provide the right framework in practice for policy integration.

3.6. CONCLUSION

With the implementation of the 2009 Act, Scotland is at the forefront of international attempts to develop integrated flood and rural land management, in part due to its commitments under the EU Floods Directive, but it has yet to translate the approach effectively into practice. Whilst existing regulatory and incentive instruments are currently inadequate for catchment flood management and rural land management techniques, there is scope for reform and there is clearly not only one recipe for potential ways forward. Scotland follows current international trends in policy processes structured around participative processes to foster collaboration, rather than through large bureaucracies. Successful implementation of integrated flood and rural land management can therefore build not only on the flood policy regime, but also on parallel ones such as water, agricultural, rural development, forestry and natural heritage policy regimes.

The research has reported a more complete analysis of the state of policy integration in Scotland than previous studies. The diversity of reviewed policies provides opportunities for effective implementation; the challenge remains to identify the best combination of instruments working “on the ground”. The research has demonstrated that the development of an adequate policy mix may face several challenges such as limited scientific evidence, reforming multi-level policy regimes, and the need to create leadership. Policy reforms towards integrated flood and rural land management may therefore not be dependent only

on what works “on the ground” but also on “upstream” factors, on the internal logic of policy regimes themselves.

The research has demonstrated that several types of mechanisms may foster policy integration, and that these mechanisms offer new empirical evidence to support ideas in the adaptive governance literature. For example, the literature calls for an iterative, experimental approach to policy processes. In this chapter, it was shown how that research, pilot projects, assessment methods, guidance documents and planning cycles all helped to generate and evaluate knowledge for policy integration, and to build capacity for transferring knowledge into social practices while maintaining flexibility for future change. It was also observed that some of these “devices” could be used as advocacy instruments, or could be more or less constrained by policy requirements (e.g. timescales, targets). Direct impact on policy integration was also difficult to observe.

Further integration may occur through the development of integrated strategies acting as roadmaps to influence whole policy regimes, or through a complete overhaul of the policy framework to create a unified policy regime. Here, this research challenges the adaptive governance literature. Resilience theory suggests that social-ecological systems should be built on the collaboration of independent units in order to reduce the risk of systemic failure, and that collaboration should primarily be built on informal procedures. However, contrary to this theory, it was shown that informal collaboration may not be sufficient to ensure adequate collaboration in statutory-driven and resource-constrained contexts such as national policy processes. More formal procedures such as the use of statutory duties and political oversight may help frame and structure policy actor interaction, and create inter-dependence between policy actors, a key process in order to secure technocratic and political commitment for change.

This research focused on five selected policy regimes relevant to catchment flood management in rural settings and on their relationship in a governance perspective. Further research could explore intra-organisational dynamics of responsible authorities and stakeholders. The data suggest that such dynamics are

important in influencing the behaviour of policy actors in the inter-organisational arena. Further research could also extend the analysis to other environmental, economic, social and spatial policies. Examining urban development or emergency planning could complement this research with a broader view of catchment flood management and its links with other dimensions of flood risk management.

The next Chapter continues the analysis of adaptive water governance, but attention now is moved on local policy processes. In particular, it examines the opportunities for, and barriers to, implementing integrated flood and rural land management, and presents an assessment of how existing policy regimes perform in that regard.

Chapter 4 Implementing Integrated Flood and Rural Land Management at the Catchment Level

4.1. INTRODUCTION

The aim of this Chapter is to evaluate ideas of adaptive water governance in local policy processes. As Chapter 3 showed, reforms in Scotland at a national level to encourage the uptake of integrated flood and rural land management are, as yet, incomplete. Local actors must therefore work with existing policy regimes to implement the approach. In this Chapter, opportunities for, and barriers to, implementing integrated flood and rural land management at a local level are examined, in particular the performance of existing policy regimes in that regard.

Research in Scotland on the implementation of integrated flood and rural land management remains rare. One study from Kenyon (2007) found that Scottish communities preferred rural land management techniques to traditional flood defences to protect them from flood risk. In contrast, research in England and Wales focusing on farmers found that the agricultural community was opposed to using rural land management techniques for flood alleviation, either through run-off retention (Posthumus and Morris, 2010) or saltmarsh creation (Parrott and Burningham, 2008). Unlike Kenyon's work which focused on local communities, these studies focused on land managers' response to agricultural and rural development policies, and how these policies could encourage change in land management. The (combined) impact of other relevant and influential policies such as flood, water and other rural land management policies was not explored.

Broader research on flood management indicates that land managers tend to oppose river and floodplain restoration at catchment scale because they use the

land for productive reasons (e.g. agriculture, forestry, development, etc) (Adams *et al.*, 2005; Moss, 2007; Mainstone and Holmes, 2010). These studies also suggest that project officers, in particular those in public organisations, often have limited capacity to reach agreements with stakeholders because they must work within organisational targets and arrangements. Moss (2007) therefore suggests that future research should look at how policies can successfully influence stakeholders, and how to improve the capacity of project officers to foster collective action.

From an adaptive (water) governance perspective, local communities are best suited to manage their local environment (Folke *et al.*, 2005). Local communities may better respond to local priorities and issues, using appropriate experience and in-depth knowledge of the local context. The capacity of local communities to self-organise would need local decision-making power. The policy framework should be responsive to their needs, and encourage local leadership in responding to local issues, and fostering ecosystem-based management (Olsson *et al.*, 2004; Fabricius *et al.*, 2007). However, adaptive governance also calls for holistic, ecosystem-based management at bio-regional levels (e.g. catchment) which necessitates the recognition of interdependencies between societal groups and coordination across administrative boundaries (Huitema *et al.*, 2009). More formal, centralised management appears therefore necessary. Adaptive governance traditionally calls for the building of decision-making arrangements that can build linkages between the local and higher levels of governance, but the adequate design of such arrangements is yet unclear (Naess *et al.*, 2005; Fish *et al.*, 2009).

Scotland offers a good empirical case to examine local policy processes, and their relationship with broader levels of governance in the context of integrated flood and rural land management. The Eddleston and Bowmont-Glen catchments of the Tweed river basin in South-East Scotland were the target of active implementation of rural land management at catchment scale. In particular, the Bowmont-Glen catchment had been subject to two major floods, leading to local community interest in collectively managing their local environment. In

comparison, the Eddleston catchment was only intermittently impacted by floods, but welcomed engagement between local promoters of rural land management techniques and land managers.

Drawing on research on the policy process, the concept of policy implementation is used to examine the uptake of integrated flood and rural land management by local actors, and the performance of national policies in that regard. Theories on policy implementation are first briefly discussed, illustrated by research on flood management. The research design is then outlined, following by an inductive analysis of local actors' views on integrated flood and rural land management, and their experience with water, flood and rural land management policies. The discussion and conclusion reflect on the main factors influencing policy implementation, and lessons learned for adaptive governance.

4.2. THEORETICAL CONTEXT

Implementation research starts from the premise that policy may be substantially modified, elaborated, or negated at this stage, the result of which being to disconnect initial aspirations and final outcomes (O'Toole, 2004). The behaviour of two main policy actors is critical in that regard: "policy implementers", those in charge of putting policy into practice, and "target populations", those who are affected by policies. In the context of integrated flood and rural land management, implementers may be associated with local representatives of agencies responsible for implementing flood, water and rural land management policies, while target populations may refer to rural land managers and local communities.

Two schools of thought have dominated implementation research: "top-down" and "bottom-up" (Barrett, 2004, Hudson and Lowe, 2004; Hill and Hupe, 2009). The top-down school is based on the idea that policy implementation should be strictly designed around the delivery of policy goals set by elected officials (mainly to guarantee the accountability of the policy process). Policy performance may be improved by reducing ambiguities on what the policy aims to achieve, and

by clearly steering the work of policy implementers. For example, a top-down analyst would primarily call for clearly defined guidance, streamlined administrative management (e.g. a single implementing authority), and improved communication between implementers (Hudson and Lowe, 2004). In contrast, the bottom-up school is built on the idea that policy implementers have an important role in adapting policies to local issues (accountability arise from the responsiveness of a policy to the aspirations of the people impacted by it). Policy performance may be improved by increasing local discretionary power, and retreating from central control. For example, a bottom-up analyst would primarily call for flexible administrative management, and providing additional resources to implementers (Barrett, 2004).

Overall, factors influencing policy implementation as highlighted by the top-down/bottom-up debate include 1) the way policies are set out in guidance, 2) the types of resources available to policy implementers (e.g. financial and technical support, skilled labour), 3) the design of administrative arrangements (e.g. organisational targets, decision-making procedures, etc), and 4) participative arrangements with other responsible organisations and stakeholders.

Recommendations arising from the top-down/bottom-up debate appear nevertheless rather contradictory with regards to the degree of autonomy implementers should have from administrative control. O'Toole (2004) suggests that the degree of local autonomy is likely to be dependent on the context in which a policy or an organisation operates. For example, central control may be more cost-effective where the objective is to implement policy uniformly, and where strong bureaucratic procedures already exist. In contrast, local autonomy might be more effective where the benefits of policy interventions at local level are unclear (e.g. context is fast changing, or interventions are highly dependent on local conditions), and where policy interventions still need to find the appropriate mode of action. Moss (2007) would for example support greater local autonomy in the context of river restoration projects, arguing that the use of organisational targets (e.g. to increase effectiveness and accountability within a public agency)

reduce success-rates because implementers do not have the discretion and authority to respond to, and overcome, local opposition and priorities.

The relationship between implementers and target populations is an important, but often neglected dimension in implementation research (Hill and Hupe, 2009). For example, land managers may play an important role in the adoption of rural land management techniques beneficial to flood alleviation, particularly so in Scotland because most land is privately managed (Wightman, 2010). Research on agricultural and rural development policies indicates that compliance with, and uptake of, new land management rules or measures is less successful in one-way relationships between implementers to land managers (i.e. where land managers are passive recipients of regulations and information). Instead, success is higher through open, critical and flexible dialogue between implementers and land managers (Burgess *et al.*, 2000; Morris, 2006; Ingram, 2008; Blackstock *et al.*, 2009).

For Schneider and Ingram (1990), target populations may respond to policies in different ways. They may comply with policy, use policy as an opportunity to achieve personal targets, or even pro-actively promote policy to other individuals. Alternatively, target populations may not comply because they disagree with the policy, they do not know what they should do to comply, they believe the policy does not concern them, or they believe the policy does not have enough resources attached to help them in taking action. In the context of integrated flood and rural land management, rural land managers' views on flooding issues and processes differs from the way experts see them. Pivot *et al.* (2002) for example observed that farmers were more concerned by small-to-medium sized floods affecting crop development, depositing gravel and eroding fields, while flood policy experts by large floods affecting urban areas. Posthumus *et al.* (2008) observed that land managers do not perceive agricultural practices as a potential contributor to flooding. One might therefore expect land managers to ignore or reject policies promoting run-off control on agricultural land, and the flooding of rural land to protect urban areas.

In the categorisation of Schneider and Ingram (1990), three dimensions appear important in the policy behaviour of target population: personal goals (e.g. interests, values), available resources, and the level of knowledge. Policies may influence these factors to induce behavioural change. Regulatory instruments may force target populations to behave against their goals; economic instruments may overcome the lack of resources, information provision may raise awareness and change beliefs in favour of the policy targets. Gunningham and Sinclair (1998) suggest that policy instruments should be mixed in order to exploit their synergies and reduce conflicts. They warn that no ideal mix exists, but, instead, policy mixes should be sensitive to the particular context in which they are crafted. For example, financial incentives and awareness raising, or self-regulation in an overall clear regulatory framework, may perform well (Gunningham and Sinclair, 1998; Howlett, 2004). Alternatively, regulations and subsidies developed independently from each other may be counter-productive (Howlett, 2004).

Several authors warn that rural land managers, in particular farmers, take decisions on land management practices primarily on economic grounds, such as available resources, financial rewards and long-term investments plans (Dwyer *et al.*, 2007; Sutherland, 2010). Other authors indicate the influence of broader psychological and sociological factors (Burton, 2004; Knowler and Bradshaw, 2007). Factors mentioned in the literature are wide ranging⁴¹. In this context, Garforth and Rehman (2006) call for the use of policy mixes where different policy instruments influence different factors in land managers' decision-making. Pike (2008) suggests that information provision should be used when psychological factors such as habits, beliefs and values are the main barriers to change. Regulatory or economic instruments should be used where external factors such as lack of financial resources, time or labour represent the main barriers to change.

Posthumus and Morris (2010) observed that a mix of prosecution and information provision was successful for promoting measures on soil erosion and run-off

⁴¹ They include for example: tenure, labour, income, expenditure, debt, equipment, succession, arable and livestock management, market conditions, age, health, experience, gender, interests, values, education, community status, peer esteem, and family context.

control amongst English farmers. To encourage uptake of saltmarsh creation against coastal flooding, Parrott and Burningham (2008) call for a combination of compensation and information provision (e.g. promoting agricultural diversification). More specifically on information provision, Blackstock *et al.* (2009) observed that direct engagement at farm level and the use of trial sites may be more successful in influencing land managers, in particular where there is no agreement on the problem or on who bears responsibility. This was the case in their research on rural land management and water quality improvements, and is likely to be more so in the case of this research on rural land management and flooding.

4.3. RESEARCH DESIGN

Local projects implementing integrated flood and rural land management in Scotland were reviewed by using the list of 13 catchment scale river restoration projects developed by Gilvear and Casas (2008), and by contacting practitioners and academics across Scotland. Projects were selected based on two main criteria. First, projects should aim to implement rural land management techniques across a whole catchment. Second, policy implementers and target populations should be engaged in discussing, selecting, and implementing rural land management techniques. Implementers were associated with public organisations involved in flood, water and rural land management policies. Target populations were private land managers, rather than local communities, because of their central role in adopting rural land management techniques. Measures included the broad definition of rural land management techniques outlined in the overall introduction.

At the time of research, three catchments fitted these criteria in Scotland: the Dee, Eddleston, and Bowmont-Glen catchments. Research was already being carried out in the Dee catchment in Aberdeenshire on the hydrology of land management and flooding. The James Hutton Institute was also engaged with land managers as part of their research. It was therefore decided to work in another context. The

Eddleston and Bowmont-Glen catchments were selected. The following three subsections present catchment characteristics, methods for collecting documentary and interview data, and methods for analysing them.

4.3.1. Catchment Characteristics

Both catchments are situated in the Tweed river basin, with the Eddleston catchment in the northern part and the Bowmont-Glen on the southern side (Figure 4.1). Table 4.1 presents some key characteristics of the two catchments. Eddleston Water flows into the River Tweed at Peebles. The Bowmont Water flows from Scotland into England where it is known as the River Glen. The River Glen flows into the River Teviot, which flows in the River Tweed, itself marking the border between England and Scotland. Appendix E presents photographic illustrations of both catchments. Both catchments are small and predominantly rural, with mixed cattle-sheep farming units. Their aquatic habitats are protected as Sites of Special Scientific Interest (SSSI)⁴² and Special Areas of Conservation (SAC)⁴³, respectively since 2001 and 2005, to protect several types of species, habitats, landscape, historical, and archaeological characteristics⁴⁴.

⁴² Set out under the Wildlife and Countryside Act 1981, Countryside and Rights of Way Act 2000 and Nature Conservation (Scotland) Act 2004.

⁴³ Set out under the EC Habitats Directive (92/43/EEC).

⁴⁴ Key species protected under SAC include: river lamprey, brook lamprey, otter, sea lamprey, Atlantic salmon, and floating vegetation such as water-crowfoot.

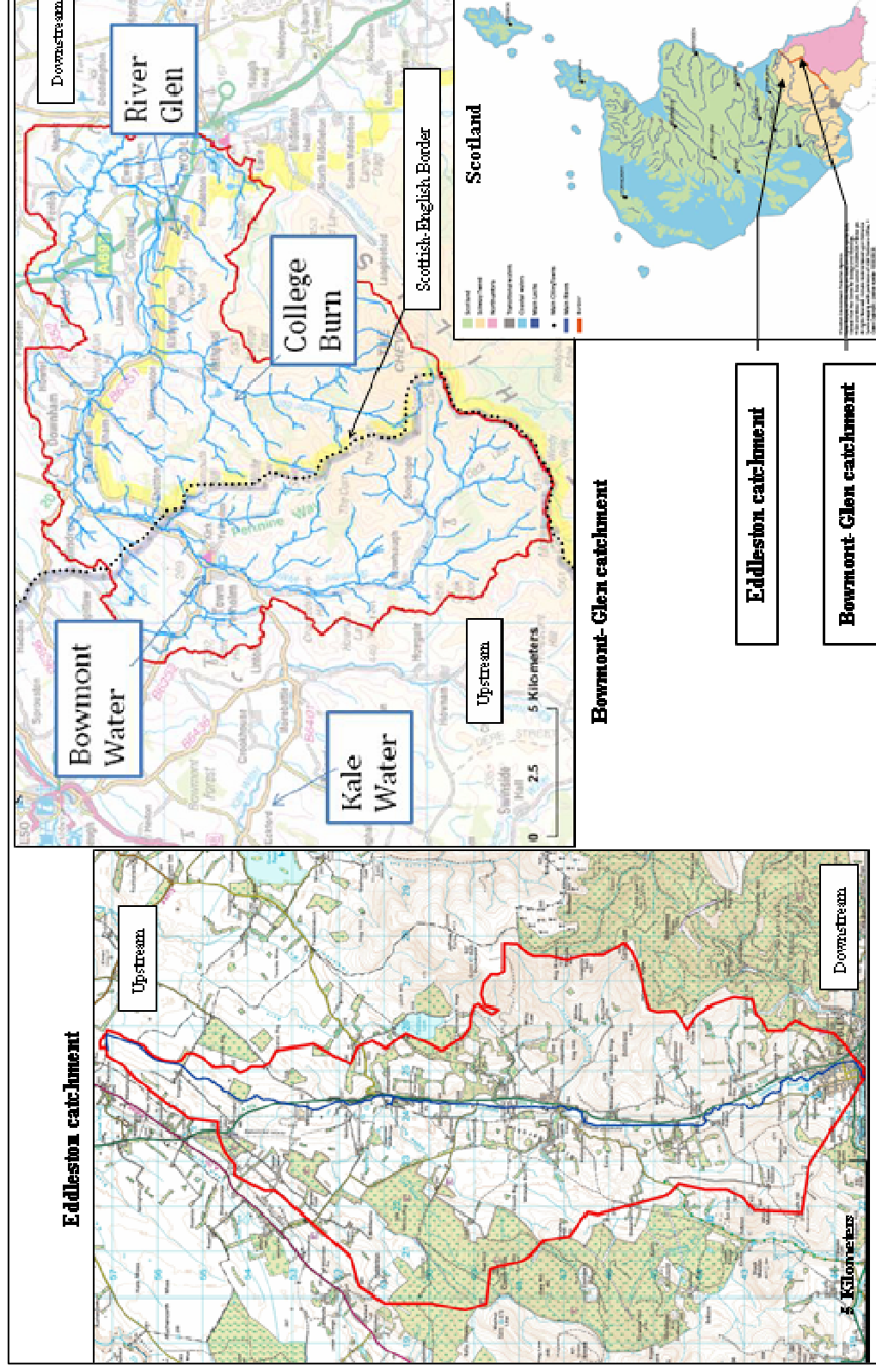


Figure 4.1 – Map of the Eddleston and Bowmont-Glen catchments (Sources: SEPA, 2005; MNV & Tweed Forum, 2010; Werritty *et al.*, 2010)

Table 4.1 - Main characteristics of the Eddleston and Bowmont-Glen catchments

	Eddleston	Bowmont-Glen
Population	Peebles: 8,065. Eddleston: 335.	Yetholm: 591. Kirknewton: 108.
Area (km ²)	70.	230.
Climate (mm annual average between 1961-1990)	850 (lower ground). 1500 (upper ground).	829 (lower ground). 1016 (upper ground).
Topography (m)	550 (peak). 160 (lowest).	814 (peak). 28 (lowest).
Geomorphology	Glacial till, alluvium, glacial sand and gravel and peat deposits.	Glacial till, alluvium and peat deposits Highly mobile, alluvial channel.
Flood risk	Flood risk to 589 properties in Eddleston village and Peebles (1 in 200 year).	Flood risk to 35 properties in Glen catchment with an additional 81 in lower catchments (1 in 100 year). No figures for Bowmont Water.
Land use	Dominantly rural landscape, mixed cattle-sheep farming and forestry Drainage and straightening for agricultural improvements.	Dominantly rural landscape, near total woodland clearance, mixed cattle-sheep farming with more arable farming downstream.

The project in the Eddleston catchment started in 2009 as a scoping study for a catchment-scale river restoration strategy with the objective of improving the morphology of the river to meet the EU WFD objectives, and reducing flood risk to Eddleston and Peebles. It was a partnership between the Scottish Government, regulatory public agencies (i.e. Scottish Environment Protection Agency –SEPA, and Scottish Natural Heritage -SNH), the local authority (i.e. Scottish Borders Council -SBC), the local fishery organisation (i.e. Tweed Foundation), and an NGO working to implement integrated catchment management in the Tweed river basin (i.e. Tweed Forum). The scoping study was initially primarily strategic in nature, focused on the production of a plan for future action by the University of Dundee. However, the Tweed Forum became closely involved with land managers in order to advertise the project, and identify existing opportunities to implement rural land management techniques. The strategy identified several opportunities, including washland and wetland creation, pulling embankments down, creating buffer strips, and planting woodland strips across slopes (Werritty *et al.*, 2010).

The project in the Bowmont-Glen started as a response to two major floods in 2008 and 2009 resulting in significant flooding of agricultural properties, and the de-stabilisation of the river channel. A conflict ensued between regulatory agencies and land managers on the techniques best suited to responding to flooding, river channel adjustment, and sediment dynamics. After the second flood, local actors agreed to hire a consultant (MNV Consulting) to prepare a catchment management plan on fluvial sediment dynamics, river channel adjustment, and flood risk. The steering group was composed of regulatory agencies on both sides of the border (SEPA, SNH and their equivalents in England, the Environment Agency –EA, and Natural England –NE), and the Scottish local authority (i.e. SBC). In addition, a land manager committee was set up to represent land managers in Scotland. No similar set-up existed in England. As was the case for the Eddleston project, the Tweed Forum was in charge of project management. The final catchment management plan identified several opportunities for flood defences (e.g. gravel removal from the river channel, river bank reinforcement, etc), and rural land management techniques, including creating river corridor and riparian woodlands using willows and gorse to stabilise river banks, creating buffer strips and woodland strips, and planting woodland in gullies (MNV and Tweed Forum, 2010).

Working in both catchments extended the range of personal and collective experience on the implementation of integrated flood and rural land management, but also provided useful contrasts. The Eddleston project was primarily driven by public organisations for urban flood risk (i.e. to the village of Eddleston and Peebles) while the Bowmont-Glen project was driven by land managers concerned about flood risk to agricultural land. Given the recent flooding in the Bowmont-Glen catchment, land managers were more aware of flood risk and problems associated with it than land managers in the Eddleston catchment. Finally, the Bowmont-Glen catchment crosses the border between Scotland and England, and therefore experience from the two national contexts could be contrasted where relevant.

4.3.2. Data Collection

Data consisted of documents and in-depth interviews. Project and community meetings were also attended (Appendix F). Group meetings were used to inform the analysis of documents and interviews by indicating areas of concern, dispute or agreement.

A total of 21 documents were collected (Appendix G) to examine the objectives and structure of local policies. Policies were selected on their relevance to integrated flood and rural land management in the Tweed river basin, including flood, water, agricultural, rural development, forestry, and natural heritage policies (see Chapter 3 for the national policy overview). They were retrieved by exploring web-sites of responsible organisations. Issues around the four checks needed on documentary analysis (i.e. authenticity, credibility, representativeness and meaning – see Research Design in Chapter 2) were limited. Documents were retrieved from established sources, and they had been published in the last 10 years. Interviews complemented their analysis which reduced further potential issues with representativeness and meaning. In addition, the analysis focused on exploring how they portray integrated flood and rural land management, rather than trying to identify intentions and agendas driving their production.

The research took a purposive, snowballing approach (see Research Design in Chapter 2) to the identification and selection of interviewees using case-study documents (i.e. policies, project documents), Ordnance Survey maps (e.g. identifying farms), and suggestions by other interviewees. Actors directly involved in the Eddleston and Bowmont-Glen projects were prioritised. In total, 43 local actors were interviewed (and a total number of 63 interviews, see below), including land managers, regulatory agencies (i.e. SEPA, SNH, EA, NE), local NGOs (i.e. Tweed Forum and Tweed Foundation), and the SBC. Table 4.2 presents the distribution of interviews between the two case-studies. Interviewees from SBC and local NGOs were involved in both case-studies. Interviews lasted between one hour and one hour and a half each. Overall, 63 interviews were carried out (Appendix H):

- 10 interviews were carried out in November 2009, and focused on the Eddleston project. Results fed into the scoping study carried out by colleagues at the University of Dundee (Werritty *et al.*, 2010).
- 18 interviews were carried out in May 2010, and focused on the Bowmont-Glen project. Results fed into the catchment management plan carried out by MNV Consulting and the Tweed Forum (MNV and Tweed Forum, 2010), as an in-kind contribution to the project.
- 35 interviews were carried out in March 2011, including 15 on additional local actors in both catchments in order to obtain a broader sample of experience, and 20 on previously interviewed local actors. They were re-interviewed to evaluate their on-going experience of the Bowmont-Glen project (see Research Design in Chapter 5 for further details on the interviews specific to the Bowmont-Glen project).

Table 4.2 - Organisations and individuals interviewed. In brackets are the numbers of interviewees from England

Interviewees	Eddleston	Bowmont-Glen
Scottish Environment Protection Agency (Scotland)	1	1
Scottish Natural Heritage (Scotland)	1	1
Environment Agency (England)	-	1
Natural England (England)	-	1
Land Managers	11	19 (7)
Scottish Borders Council		3
Tweed Forum		3 (1)
Tweed Foundation		1
Total		43

Land managers included 23 farmers, three retired landowners, one landowner working in the tertiary sector, one Estate farm manager, and two Estate managers. Land managers ranged from mid-thirties to mid-seventies. Most had lived most of their lives in the catchments. Table 4.3 presents the key characteristics of properties, excluding Estates. A larger number of land managers were interviewed in the Bowmont-Glen catchment. The size of properties varied greatly, from two hectares to 1,762 ha. Given the priority given to agricultural land managers, the

sample is dominated by farm businesses, in particular sheep farming. Livestock flock size varied from no sheep to 4,400 breeding ewes, and from no cattle to 800 cows.

Table 4.3 - Overall characteristics of land managers (other than Estate)

	Total	Average	Median	Min	Max
Eddleston					
Size of holdings (ha) (other than Estate, N=10)	1,641	164	182	2	365
Number of sheep (farms only, N=6)	3,800	633	600	500	850
Number of cattle (farms only, N=6)	480	80	80	0	150
Bowmont-Glen					
Size of holdings (ha) (other than Estate, N=17)	11,761	692	527	186	1,762
Number of sheep (farms only, N=17)	25,230	1,484	1,100	0	4,400
Number of cattle (farms only, N=17)	2,490	146	100	0	800

Other key business characteristics were collected from farmers such as cropping patterns, labour, income sources, tenancy agreements, and succession. From the farmers included, 12 were landowners, six were tenants, and five were mixed landowners-tenants. Farming systems were diverse with a wide range of income sources.

Table 4.4 is an attempt to categorise the 23 farms into idealised types developed by the Scottish Government (SG, 2010a). Categorisation is qualitative and based on information provided by farmers on livestock size and cropping area. Specialised sheep farming units dominated higher grounds and mixed arable-farming units on lower grounds. A single farm was dominated by arable farming and another by poultry production. The crop with the greatest extent in both catchments was grass for hay and silage, but many farms also had varying areas of cereals (e.g. wheat, barley, oats, and oilseed rape), turnips, kale, potatoes and peas. As Table 4.4 presents, different types of farms have widely different financial characteristics. Arable farms tend to be the most profitable, while sheep farming the least. The reliance on governmental subsidies is greatest for sheep farming than for other farming systems.

Table 4.4 - Average income for each type of farms present in the case-studies

Farm type	Number of farms in Eddleston (N=6)	Number of farms in Bowmont-Glen (N=17)	Number of farms in both case-studies (N=23)	% of farms in Scotland**	Annual net farm income (£/farm)**	Annual average subsidies and payments (£/farm)**
Cattle and sheep (LFA*)	4 (67%)	5 (29%)	9 (39%)	14%	18,938	56,900
Sheep (LFA*)	2 (33%)	5 (29%)	7 (30%)	8%	9,100	29,911
Mixed	-	6 (35%)	6 (26%)	14%	32,028	50,333
General cropping	-	1 (6%)	1 (4%)	11%	41,371	40,393

* Farms in these categories were classified in Less Favoured Areas

**Data from SG, 2010a

19 farms had other forms of income, from a working partner or other activities such as tourism (e.g. cottage renting), farm contracting, or forestry and infrastructure works. Eight were working with their children or family members who were likely to be future successors. Eight were working independently and had young children meaning succession was less secured. Seven were working independently and did not have designated or potential successor

One Estate farm manager was interviewed in the Eddleston catchment. The Estate was 3,000 ha with income from the farm, forestry, and Estate owner's private income (unrelated to the Estate business). In the Bowmont-Glen catchment, one Estate manager on each side of the border was interviewed. The Scottish Estate owned 55,000 ha, including 10,151 ha in the Bowmont catchment, and rented land to seven of the land managers interviewed. Its income was very varied, from let estate (i.e. land, cottages, shooting and fishing rights) to run estate (i.e. farming, forestry, tourism, trading businesses, golf course, sporting) and others (e.g. tourism). The English Estate owned 1,250 ha, and its income came from renting land, forestry, and the Estate owner's private income (unrelated to the Estate business).

Interviews were semi-structured. Templates were developed based on theories on policy implementation. They included: 1) background of the interviewee, 2) views on the management project, 3) views on management options, 4) views on

policies and policy instruments, and 5) views on other local actors (Table 4.5 and Table 4.6). Templates were adapted to local context, but maintained the original themes. They evolved over the research period to reflect new issues. In the last round of interviews (March 2011), additional questions were added for additional interviews carried out in the Bowmont-Glen catchment. This was to inform the analysis performed in Chapter 5 on the participative process.

4.3.3. Data Analysis

The analytical process was inductive and the analysis of documents and interviews were carried out separately and outcomes were compared.

The analysis of documents was similar to the one performed in Chapter 3 for documents on national Scottish policies. It focused on identifying how selected policies described the links between flood and rural land management in problem construction and policy objectives. Policy instruments and procedures that may influence integrated flood and rural land management were also identified, and their characteristics mapped out.

The analytical process for interviews used thematic analysis also used in Chapter 2. Interviews were recorded and fully transcribed. All interview transcripts were coded and categorised through NVIVO8. The researcher coded and categorised data from the November 2009, May 2010 and March 2011 following data collection in order to feed in the Eddelston scoping study and the Bowmont-Glen catchment management plan. Results presented in this Chapter are based on the successive integration of the coding and categorisation of each round of interviews in the same inductive, thematic based approach. Coding synthesised the substantive meaning of interviewees' answers. In total, 1,003 codes were created with data from the November 2009, May 2010 and March 2011 interviews. Codes were associated with 23 first-level categories, themselves associated with three second-level categories (Figure 4.2).

Table 4.5 - Interview templates of local case-studies for all land managers

General personal information

Could you tell me a bit about your background and occupation? Do you work with other people or organisations? Have you been affected by flooding, and if yes, how? Do you think you might be affected by flooding in the future?

Views on management options

Are you involved in the project? How did you get involved? What motivates you? What do you think of e.g. dredging, reinforcing river banks, planting vegetation along the river, fencing off the river, create ponds/wetlands, planting trees in the floodplain/hills, removing embankments, re-meandering? How may it affect you? Would you be willing to take forward some of these measures, why and how? Would you like more information? What type of information?

Experience of policies

Are you aware of regulations protecting the river environment? Do you support them, and why? Are you aware of agri-environment schemes? What is your experience with those?

Additional questions on Bowmont-Glen project in March 2011 interview round

How well has the project been managed? How well have people collaborated? Have disagreements been overcome? If yes, how? What do you think of the documents provided? What do you think of the final management options? Are you willing to implement some of the measures, why and how?

Table 4.6 - Interview template for participating regulatory agencies, the Scottish local authority, Tweed Forum, and Tweed Foundation

General personal information

Could you tell me a bit about your background and occupation? Do you work with other people or organisations? What is your role with regards to flood management?

Views on management options

How did you get involved in the project? What motivates your organisation in participating? What do you think of the management options? How would you fund the management options? What other mechanisms (regulations, training, etc) could be used to encourage uptake of management options? Do you intend to get involved further?

Experience of policies

What is your past experience of regulations protecting the river environment and economic incentives for changing rural land management? How do you work with other organisations to implement regulations/economic incentives? Are they suited for achieving a catchment approach to flood management?

Additional questions on Bowmont-Glen project in March 2011 interview round

How well has the project been managed? How well have people collaborated? Have disagreements been overcome? If yes, how? What do you think of the documents provided? What do you think of the measures? Are you helping with the implementation of the measures, why and how?

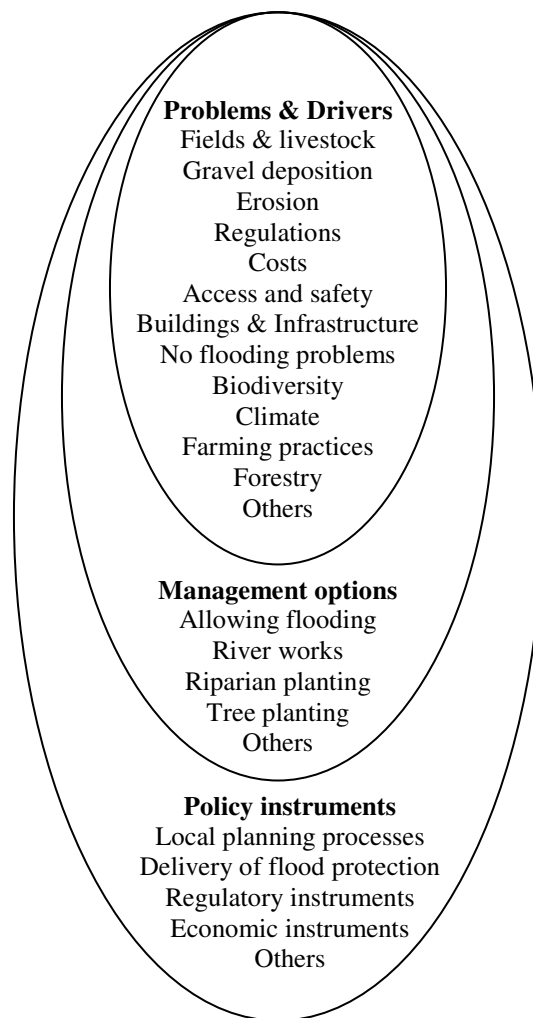


Figure 4.2 - Categorisation of concepts arising from interview analysis, comprising three second-level categories and 23 first-level categories within these

For the purpose of this Chapter, categories were informed by what interviewees had to say about problems with flooding, management options, and policies. Codes for each of the 23 first-level categories were retrieved onto word documents. Patterns of agreements and disagreements between codes were explored to test the nature and strength of 1) the internal dimensions of each category, and 2) relationships with other first-level categories. The result was to provide, for each first-level category, an understanding of its main characteristics and how they fitted with other categories.

The choice of using the same thematic structure for all interviews, initially disregarding where the interview was carried out, with whom and when, was to allow the widest, most varied cross-thematic comparison possible between claims of all local actors interviewed. The risk was however that the contextual nature of the claim could be lost, or those interviewed twice might be double counted. Thus, once the main characteristics of each first-level category, and how they fitted together, were identified, the analysis took into account who made claims and when. This enriched the analysis by bringing the data back into its context.

The researcher had the opportunity to present interim results to local actors through reports (MNV and Tweed Forum, 2010) and, when possible, during the March 2011 round of interviews and meetings (after the interview). The researcher specifically asked for oral and written feedback. Feedback was positive and did not lead to changes in the outcome of the research.

Finally, results from the analysis of documents and interviews were compared with theories on policy implementation. Because second-level categories were informed by theories on policy implementation, they help draw links between the data and theory. The discussion presents the outcome of the comparison between the main results and 1) concepts and theories on policy implementation and instruments, and 2) results from research in other contexts in order to test the relevance, fit and broader applicability of the results. The next section presents the results as a discussion of local actors' perception of flooding issues, rural land management techniques, and relevant policies. The documentary analysis complements the analysis of policies.

4.4. RESULTS

The Results section is divided into two parts. The first part presents an evaluation of agreements and disagreements between local actors regarding their perceptions of issues associated with flooding and rural land management techniques beneficial for flood alleviation. Building on this context setting, the second part

presents opportunities, and limitations, created by policy instruments in fostering rural land management techniques at the catchment scale.

4.4.1. Impacts of Flooding

Table 4.7 synthesises flood related problems in the two catchments as viewed by land managers. Overall, flooding was a more salient problem for land managers in the Bowmont-Glen catchment than in the Eddleston, explained by the recent 2008 and 2009 floods in the catchment. Land managers in the Eddleston were more concerned by flood risk to crops and livestock, while land managers in the Bowmont-Glen by the movement of river channels across the floodplain and the creation of meanders. Other issues included damage to infrastructure such as fences and roads, and damage to buildings. Land managers mentioned the trauma of the flood event, the feeling of isolation when access is cut-off, and the long-term feeling that it may happen again. Very few cases of livestock loss were reported.

Table 4.7 - Main issues with regards to flooding perceived by land managers (multiple answers possible)

Catchment		Eddleston (n=11)	Bowmont (n=19)	Total (n=30)
Level of concern	Low	7	6	13
	High	4	13	17
Issues	Re-meandering	2	14	16
	Flood risk to crops and livestock	3	11	14
	Flood risk to infrastructure	1	9	10
	Gravel deposition	0	7	7
	Flood risk to building	2	5	7
	Amenity	2	5	7

In the Bowmont-Glen catchment, gravel deposition on fields and flood risk to infrastructure, in particular road access to upland remote areas of the catchment were commonly reported. Gravel deposition in particular may lead to reduced yields and complicates field machinery operation. Land managers' problems with

channel and gravel movements occur in the context of a naturally very dynamic fluvial environment (MNV and Tweed Forum, 2010). The commonly held view was that:

“There used to be a hard basin in the river, river banks had trees and gorse was growing on them. The river stayed where it was but because the river bed is now full of gravel, it spills out a lot quicker, starts eroding parts of the river banks away and dumps gravel further down” (Land Manager 27, 24/05/2010).

Land managers observed that, naturally, the river channel is very unstable. Flood defences needed to be done to protect fields and properties from being eroded or flooded. Over time, reinforced river banks and flood embankments were created across the whole catchment, and rivers were dredged to keep the river’s flow capacity. Land managers were in conflict with SEPA and SNH on the Scottish side, and the EA and NE on the English side because environmental regulations were preventing them from dredging the river and maintaining river and flood banks (see Views on Policy Instruments).

The Eddleston catchment also had a long history of river bank reinforcement and flood embankment works as well as straightened stretches possibly associated with agricultural improvements and infrastructure development in the 19th century (Werritty *et al.*, 2010). River channels in the Eddleston were perceived as stable by interviewees. Moving river channels represented a source of concern only for two land managers. Recent flooding had mostly affected the urban areas of Peebles and Eddleston, and land managers blamed inappropriate urban development for increasing flood risk.

The views of agencies, NGOs and the local authority SBC interviewees were closely related to each other. They observed that rivers in the Eddleston and Bowmont-Glen catchments were embedded in erodible floodplains resulting in naturally dynamic, laterally moving channels. Without river maintenance, flooding and gravel deposition were very likely, and stricter environmental regulations to safeguard aquatic habitats were therefore naturally going to conflict with land managers’ interests. The main problems, in particular for agencies, were the historical lack of attention to the environmental impacts of flood defences, and

the mismatch between land management practices (e.g. intensive grazing, arable farming) and the natural characteristic of these catchments. The quote below illustrates this point of view:

“The river has got better from an environmental perspective with regulations because those gravel bars that the farmers complain about are actually an important natural element. If you go back over historical time, the river was all over the place and probably moved around quite regularly. It wasn’t restricted by our land management. The philosophy is to try to make agriculture more sustainable and minimise those impacts” (NE, 21/03/2011).

Agencies, NGOs and the SBC interviewees differed with respect to their core interests in these projects. In Scotland, SBC was the main responsible body for flood management. Its main concerns were flood risk to valuable urban settlements in the Eddleston catchment, and damage to infrastructure in the Bowmont catchment. SEPA had a new role in regulating activities that may impact the water environment, and therefore its main concern was ensuring land managers complied with regulations when constructing flood defences. In contrast, the EA in England historically dredged rivers in rural areas, and maintained flood banks for agriculture. Its predecessor, the National Rivers Authority, was an active actor in the construction and maintenance of flood defences for agricultural land. The EA’s main concern was justifying the phasing out of maintenance on existing rural flood defences, and ensuring land managers followed environmental regulations and best practice. With their role in biodiversity and fisheries protection, SNH, NE and the Tweed Foundation had an interest in minimising environmental damage from flood management. The core interest of the Tweed Forum was to promote integrated river basin management, and strike a balance between water and land management interests.

Further analysis of agencies’ statutory responsibilities is carried out in sub-sections on policy instruments. The next sub-section presents views of local actors on rural land management techniques beneficial to flood alleviation.

4.4.2. Impacts of Management Measures

Four general categories of river and rural land management measures were identified based on local actors' views of their positive and negative impacts, including: flood defences, riparian flooding, riparian planting, and tree planting in the wider landscape. Table 4.8 presents the number of land managers willing to carry out each type of identified measures. These measures do not strictly reflect the classification presented in Table 4.8, nor do they cover all measures. Instead, the inductive analysis led to the identification of four broad classes of rural land management techniques as perceived by land managers. While this classification may be less policy-relevant, it illustrates better how land managers think of rural land management techniques, and how the location (e.g. riparian zones/hills) and the type of vegetation change (e.g. arable/grassland/trees) are important criteria. Table 4.9 presents positive and negative impacts for each category, as viewed by land managers. They are discussed in turn below.

Table 4.8 - Number of land managers willing to carry out river and land management measures for flood management, without financial support (nFS) and with financial support (FS) (multiple answers possible)

Catchment	Flood defences		Riparian flooding		Riparian planting		Tree planting	
	nFS	FS	nFS	FS	nFS	FS	nFS	FS
Eddleston (N=11)	6	6	3	4	1	8	2	8
Bowmont (N=19)	12	17	4	12	6	15	1	14
Total (N=30)	18	23	7	19	7	23	3	22

Table 4.9 - Positive and negative impacts of management options identified by land managers

Measure	Positive impacts	Negative impacts
Flood defences (e.g. dredging, re-profiling, bank reinforcement, gravel removal)	<ul style="list-style-type: none"> • Stabilises movement of river. • Prevents build up of sediments in river. • Direct protection of property and fields. • Cheapest option if done regularly. • Feeling the river is back to where it was. 	<ul style="list-style-type: none"> • Instable as done on gravel bed, long-term costs through maintenance. • Expensive if not done regularly. • May impact on fishing. • Engineering works impact amenity.
Riparian flooding (e.g. washlands, river re-meandering, and breached embankment)	<ul style="list-style-type: none"> • Brings in water and nutrients. • No maintenance costs for river bank and gravel removal. • Breached embankments reduce risk of standing water on protected land when flood waters overtop defences. 	<ul style="list-style-type: none"> • Increased flood risk to livestock, crops and bales. • Eroding land reduces property area and grazing ground: lost capital value, lost grazing opportunity, impacts on rents and subsidies. • Shallower channels impact spawning potential. • Eroding land and lack of riparian vegetation reduces amenity of valley.
Riparian planting (e.g. pasture and vegetation)	<ul style="list-style-type: none"> • Stabilises river banks and helps prevent deposition of gravel on fields. • Increases biodiversity and amenity. • Can be targeted to less productive land. • When established, can provide shelter and grazing ground to livestock (but only sheep as cattle are heavier and may damage river banks). 	<ul style="list-style-type: none"> • Need regular removal of gravel to prevent build up in river but coming in with digger is difficult with vegetation. • Loss of grazing in upland floodplains where space is very limited. • Non-established vegetation is vulnerable to flooding and grazing. • Risk of flood damages to fencing. • Expensive (reinforcing river banks, planting vegetation). • Loss of productive ground. • Reduced cattle access to river for drinking water.
Tree planting (e.g. woodlands and hedgerows)	<ul style="list-style-type: none"> • Provides shelter for livestock. • Provide an additional source of income (if commercial). • Increases biodiversity and amenity (if hedgerows, broadleaves and native trees). • Can improve shooting. • Increased recreation opportunities. • When established, could be combined with livestock grazing (between trees). 	<ul style="list-style-type: none"> • Reduces income as land is taken out of production. • Lost opportunity for future farming generations. • Changes the nature of the farm and its purpose. • Expensive works, may lose single farm payment. • Changes tenancy agreement. • Impacts upland farmers more than floodplain farmers. • Complicates livestock management. • Pose a risk in large floods as trees fall down in river. • May reduce water flow in dry periods.

The majority of land managers (e.g. 18 out of 30 with no financial support; 23 out of 30 with financial support), in particular those with farming backgrounds, were willing to carry out flood defences to protect their properties. Arable and mixed arable-sheep farmers in the lower part of the catchment were using the floodplain intensively, and depended on the protection of flood banks for agricultural production. Sheep farmers in the upper part of the catchment used floodplain fields to provide feed and bedding for livestock. Land managers thought nevertheless that the costs of flood defences (and getting authorisation, see Views on Policy Instruments) could be prohibitive. They doubted that flood defences could alleviate risks against large floods. They therefore believed that small, targeted flood defences were by far the best option to protect productive land against small and medium floods, and reduce river channel erosion and gravel deposition, while keeping costs low. As one interviewee puts it:

“People should at least be allowed to do small matters to protect their productive ground and property. I am not saying we should be doing big jobs but small scale jobs for which we shouldn't have to worry about getting permission from SEPA or whoever” (Land Manager 23, 20/05/2010).

Three other factors appear important in the decision-making: landownership, succession, and cultural values. First, landowners and tenants alike held the view that landowners were more likely to be pro-active than tenants because they had a long-term interest in increasing land value. Second, references to succession, and the long term interest in keeping land productive, were recurrent in interviews. For example, two neighbours were keen to compare (in separate interviews) their respective decision of carrying out flood defences, or not, on the same stretch of river. One was keener in investing in flood defences because the land will be farmed by her children in the future. The other was less keen as he was soon retiring, and did not secure family succession. Third, familiarity with a particular landscape may influence the attitudes of land managers towards flood defences. For example, land managers in the Bowmont-Glen catchment observed that floods resulted in the valley “not looking the same”, the river “being all over the place”, and doing nothing led to “messy” ground with a mix of gravel, debris and weeds. Flood defences would put the river back to where it was.

Land managers were ambivalent about the impact of flood defences on downstream flooding, and relied on personal experience and observations. In the Eddleston, two land managers valued riparian flooding over flood defences for its effect on flood risk:

“We are fortunate that when the stream is high, it bursts its banks and goes into the water meadow. I would be more concerned if you were to try and deepen it and all water was going down in a force against the bridge. It is actually better that it dissipates” (Land Manager 10, 14/11/2009).

“If you were sorting the flood here, the water goes away and you would end up with more floods further down. You must have an area for water to go to” (Land Manager 9, November 2009).

In contrast, most other land managers did not readily agree that flood defences could significantly increase flood risk downstream, although they agreed that flood defences could modify river flow and flood risk locally. Land managers in the Bowmont-Glen catchment were commonly worried by the impact of flood defences built by their neighbours on their property. For example:

“I know my neighbour is planning on putting big flood defences round his farm and he is going to push all the water over to one side of the valley further on where my cattle are. Whatever our neighbour does, it always impacts the person further down the valley. He might think it is grand for him but it will impact on your neighbour, whether it is gravel getting dumped or the force of the water is being changed” (Land Manager 27, 24/05/2010).

When prompted during interviews with questions about whether flood defences should therefore not be done, land managers commonly answered that flood defences should instead be carry out across the whole catchment to reduce flood risk on all properties. Land managers would prioritise the protection of their properties despite the potential impact on downstream properties and communities. Doing something beneficial for the community may nevertheless play a role for some land managers. For example, two land managers mentioned that they were willing to help lower flood risk for downstream community if changes in river and land management can have a measurable impact.

Allowing riparian flooding encompasses allowing the river to meander naturally and flood riparian land, and/or creating washlands to store flood waters. Land managers with no farming interest (e.g. third sector worker, retired landowners)

had mixed reactions to the idea of abandoning riparian land to the river. Two saw it as an opportunity to improve the amenity of the river, while two were actively against the idea because they did not want to lose land. Most other land managers also commonly resisted abandoning productive land to the river, and associated rents and subsidies (e.g. seven out of 30 would do so without financial assistance). Land managers would often observe the cultural dimension of losing ground to the river, and abandoning what generations of farmers have fought for:

“I’m not a believer in breaching banks for compensation. The flood banks I’m involved with have been there for generations. I’ve stood on top them on many a big flood and they just seem to be to me in the right place, the right height, well constructed and I think they’ve been a work of art. They’ve stood the test of time and I think they do a tremendous job. Now to suddenly say you know let’s make a hole in them, the precious land behind them that we’ve worked on, we’ve protected for years, I think it’s all wrong” (Land Manager 30, 25/05/2010).

Despite this attachment to productive ground, most were willing to abandon small areas of riparian land where they thought that it was not economically viable to maintain it in good farming conditions (e.g. 19 out of 30 were willing to do so with financial support). In the Bowmont-Glen catchment, this latter feeling was exacerbated by the higher frequency of damaging floods.

Riparian planting involves the planting of vegetation (e.g. trees, bushes and gorse) on river banks and adjacent land. It provoked mixed feelings amongst land managers. Seven land managers reported planting riparian vegetation, without financial support, to help stabilise river banks, reduce gravel deposition, and/or increase amenity:

“Trees would help hold the riverbank together and hold much of the gravel. When you see further down, there are dense gorse bushes and the river hasn’t pushed its way out as much” (Land Manager 23, 20/05/2010).

Nevertheless, land managers also regarded riparian vegetation as a potential threat if washed away during a flood, and as a potential hindrance for livestock’s access to drinking water. In addition, planting vegetation resulted in losing productive ground in the floodplain, and associated rents and agricultural subsidies. It also may lead to on-going costs for setting up and maintaining fences, potentially higher on riparian land because of the risk of getting them washed away by

floods. Finally, riparian vegetation may trap sediments in the river channel, potentially increasing the risk of overflow.

One land manager felt very strongly that using a mix of riparian planting, to stabilise the river and work as a barrier against gravel, and flood defences, to extract gravel deposited in the river bed, was the best way to work with nature:

“You plant willows or whatever to support the bank where it needs to be supported. Where you have these gravel deposits are dropped, you need to clean them out. It will need to happen to keep the channels free and push a bit of gravel into weak spots or plant some willow trees to strengthen a bit” (Land Manager 21, 21/05/2010)

Tree planting across the broader landscape may include hedgerows, small woodlands, and large plantations. Land managers, in particular farmers and Estates, in the Eddleston and Bowmont-Glen were not supportive of this idea because it could represent a significant change in the way they ran their farms (e.g. three out of 30 would do this measure without financial support). Also, they did not feel competent in growing trees. For arable farmers, any loss of productive ground to trees could represent significant losses in income. For livestock farms, badly designed tree planting on the hills could represent barriers to livestock movement and make their gathering more complex. Landowners and tenants alike were of the view that tree planting was more attractive to landowners than tenants because benefits were long-term, in particular for amenity, shelter and biodiversity and therefore land value.

Despite this, land managers looked at tree planting favourably, in particular if financial support was provided (e.g. 22 out of 30 were willing to plant trees with financial support). The most important consideration was to target planting in appropriate areas, rather than carrying out large-scale operations. As one land manager puts it:

“Sheep farming is just more profitable than planting trees and we will not enter negotiations with a farm tenant saying we want 250 acres of your grassland. Large-scale planting is a nonstarter, but I cannot see a problem with small-scale planting. It depends on where” (Land Manager 1, 18/03/2011).

Two land managers suggested that felling of trees had been accompanied by more floods, explained by the loss of vegetative cover. Others observed that forests did not hold much water anyway because of the small area planted in the two catchments, or because they were underpinned by extensive drains. No land manager readily agreed that agricultural land management could exacerbate flood risk downstream.

Views of agencies, NGOs and the SBC interviewees were closely related to each other. Flood defences may help reduce flooding at property level, but they may cause environmental damage and may increase flood risk downstream. All agencies, NGOs and the SBC interviewees also referred to the scientific debates regarding the effectiveness of rural land management techniques as discussed in Chapter 1, 2 and 3. All of these interviewees called for further firm evidence before widespread acceptance, although additionally all supported in principle the implementation of rural land management techniques in view of the multiple benefits they may provide, such as water quality improvements and biodiversity enhancement. The search for multiple benefits at catchment scale was a strong common objective for all interviewees.

Views slightly diverged on the relative importance of different measures. SEPA and the EA interviewees, with their statutory duties in improving the water environment and policy objectives had an interest in avoiding flood defences to prevent deterioration, restoring riparian features to improve the ecology of the river, and encouraging flood storage to reduce flood risk downstream. SNH and NE interviewees, with their duties for habitat improvement across the wider landscape, were keen on those measures, but also in encouraging less intensive land use in the wider countryside, such as reverting farmland into natural woodlands. SBC interviewees were keener on using flood defences to protect urban areas, but they were also interested in some rural land management techniques, in particular flood storage areas such as washlands. The Tweed Forum interviewees, with their integrated water and land management objectives, aimed for an adequate balance of measures, and finding opportunities to implement rural land management techniques. The Tweed Foundation interviewee saw the status

of rivers in the Eddleston and Bowmont catchments as good for fisheries and was keen to prevent any deterioration.

The variety of views and interests amongst local actors suggest that opportunities for land management changes are likely to be negotiated on a case-by-case basis. Attention will now turn to policy instruments and how they encourage rural land management changes at catchment scale.

4.4.3. Views on Policy Instruments

This sub-section examines what opportunities, and barriers, flooding, water, agricultural, rural development, natural heritage and forestry policies present at local level to encouraging uptake of rural land management techniques at the catchment scale. The following themes are examined in turn: local policy planning, flood protection delivery, regulatory instruments, and economic instruments.

4.4.3.1. Local Planning Processes

No statutory catchment flood management plan exists yet in the two catchments although one should be prepared for 2015 for the Scottish side under the Flood Risk Management (Scotland) Act 2009 (the 2009 Act) (see Flood Policy in Chapter 3). Under the Flood Prevention and Land Drainage (Scotland) Act 1997 (the 1997 Act), biennial reports synthesising actions taken to reduce flood risk must be prepared by SBC in order to improve the visibility of actions taken to reduce flood risk locally. Recent SBC reports are now giving more prominence to a catchment wide approach to flood management and the use of rural land management techniques, featuring projects such as the Eddleston Scoping Study and the Bowmont-Glen catchment management plan (SBC, 2009). In England, the EA prepared a non-statutory catchment flood management plan for the upper and lower Glen catchment as part of their national policy for flood management (EA, 2009). The plan includes several references to rural land management techniques,

such as the use of sustainable land management in rural areas, removing rural flood defences, and working with natural processes in order to reduce flood risk.

A statutory, transboundary Solway-Tweed River Basin Management Plan (RBMP) has been prepared jointly by SEPA and the EA under the EU WFD. Eddleston Water was classified as poor status due to its general morphological status; the Bowmont Water as good status in 2009; and the River Glen as heavily modified due to historical flood protection structures (EA, 2009; SEPA and EA, 2009). The content of the RBMP was discussed in Chapter 3 (see Water Policy) which showed that several measures had side-benefits for flood alleviation. A non-statutory Catchment Management Plan for the whole Tweed river basin also exists in parallel to the RBMP, developed in 2003, and updated in 2010, by the Tweed Forum in collaboration with public bodies and interest-groups. The plan is more comprehensive than the RBMP on the links between flood, water, and rural land management. It includes several objectives with regard to using rural land management techniques, such as supporting research, producing and disseminating guidance, and exploiting opportunities for implementation (TF, 2010a).

Older policies on natural heritage and forestry refer to the potential negative impacts of flood defences on biodiversity, and the role of natural flooding in enhancing natural heritage (e.g. SBC, 2001a, 2001b; SNH, 2002; SBC, 2004). More recent policies emphasise the role of natural habitats and forestry in alleviating flood risk. For example, the current SNH policy for the Borders region (where the Tweed river basin mostly lies) suggests promoting catchment based flood management through land management and habitat restoration (SNH, 2009f), while the SBC Borders Wetland Vision (SBC, 2006) and the Tweed Forum Wetland Strategy (TF, 2010b) outline a strategic framework for improving wetlands including their flood alleviation role. Similarly, the SBC Woodland and Forestry Strategy (SBC, 2005) and the Forestry Commission Scotland (FC-Scotland) Strategic Plan for Dumfries and Borders (FC, 2009a) encourage investment harnessing the potential of forests in alleviating flooding.

Priorities for the Scottish Rural Development Programme (SRDP) and the Rural Development Programme for England (RDPE) are set at national level (SG, 2007b; DEFRA, 2007b). However, each SRDP region (see Agricultural and Rural Development Policies in Chapter 4) can select national priorities that are most relevant locally. SRDP priorities for the Borders encourage meeting the Solway-Tweed RBMP and the Tweed Forum Catchment Management Plan⁴⁵. Two sub-priorities in particular aim to mitigate flooding, including one for Sustainable Flood Management (SFM) and improved protection of areas at risk from environmental risks. Measures include the protection of river banks (e.g. livestock access, wet grasslands, and river bank woodlands), and the creation of buffer strips and constructed wetlands. In England, priorities of the RDPE in the Tweed valley include objectives for biodiversity, landscape, historic environment, and resource protection. Flood management is not a priority, but objectives such as soil erosion control and flood alleviation are highlighted (NE, 2008).

Agencies, SBC and NGOs interviewees explained that the level of coherence in these policies, although not perfect, was successfully reached thanks to a partnership approach between local actors. They mentioned actively communicating and engaging with each other through several stakeholder groups where they meet the “usual suspects”. One agency interviewee for example explained:

“Because we are involved with all these people, we work together with them, we try and have in the past to be as pragmatic as we can and use our discretion. But we locally try to be as pragmatic as we can to help everyone else together. We all work together basically and that’s, I mean that’s the beauty of the way things operate in the Borders, that we have a partnership system where everybody’s concerned about managing the whole region basically” (SNH 3, 29/03/2011).

The Borders FLAG (see Flood Policy in Chapter 3) was set up in 2002 and since 2008 has included relevant English stakeholders (TF, 2010a). In water policy, the non-statutory Tweed Collaborative Action, created to support the work of the Tweed Forum has offered an informal platform for stakeholder engagement and partnership-working. The updated version stresses the importance of “*continuing*

⁴⁵ Source: <http://www.scotland.gov.uk/Topics/farmingrural/SRDP/RuralPriorities/Borders>, (03/06/2011).

to ensure effective stakeholder engagement and interaction” and “a learning approach based on open decision-making to all interested parties” (TF, 2010a, p. 66). The Solway-Tweed Area Advisory Group, supporting the development and implementation of RBMP, is now managed by the Tweed Forum. Other local stakeholder groups commonly mentioned by interviewees include the Local Biodiversity Action Plans, Regional Proposal Assessment Committees (RPAC) (see Natural Heritage and Forestry Policies, and Agricultural and Rural Development Policies in Chapter 3).

Overall, local planning processes include to some extent rural land management techniques, and offer opportunities to raise its profile. The following sub-section focuses on instruments for the delivery of flood protection.

4.4.3.2. Flood Protection Delivery

The delivery of flood protection is the responsibility of SBC in Scotland and the EA in England⁴⁶. Interviews with these organisations suggest that the delivery of flood protection is being held back by significant economic constraints. In Scotland, the impacts of changed financial arrangements for the funding of Flood Protection Schemes (FPS, known as Flood Prevention Schemes before 2009) since 2007 appear to result in delays for large-scale projects, a potential issue discussed in Chapter 2 and Chapter 3:

“It is more difficult to fund major work because the money is no longer scheme specific. It is unlikely that there will be full implementation of the Selkirk or Hawick schemes until the local authority gives more priority or the government changes the funding mechanism. The strategy is to complete flood orders in phases, first focusing on Galashiels” (SBC 1, 09/03/2011).

In this context, SBC interviewees viewed their participation in the Eddleston project, and the implementation of rural land management techniques, as a way to demonstrate interest and action while minimising costs:

⁴⁶ In England, most responsibilities are shared between the EA and the local authority (Northumberland County Council). The Northumberland Regional Flood Defence Committee also acts as a decision-making body for flood and coastal erosion management investments. It is to be reformed into the Northumberland Regional Flood and Coastal Committee as part of the implementation of the Flood and Water Management Act 2010.

“Eddleston and Peebles are not on a priority because the scale of flood risk is less than other areas, but people at risk in Peebles will feel as important as those in other places. By doing Natural Flood Management, the local authority can be seen as doing something that can make some difference” (SBC 1, 09/03/2011).

SBC was less involved in the Bowmont-Glen catchment because floods did not threaten major urban areas. It helped fund the catchment management plan in order to identify the best way to improve access and infrastructure, and their resilience against flooding. In England, participation to the catchment management plan was driven by their new organisational priorities (i.e. reducing expenditures, retreating maintenance, stricter environmental protection), and the philosophy of the whole catchment approach:

“It was a desire from us to be seen in a more considered way and engage with land managers to make them realise the potential impact of dredging and maintaining flood banks on the water environment and downstream flood risk. And the other aim was of course in terms of the money that we have available for any of these hard engineering defences is extremely limited and it gets prioritised accordingly. There was never going to be this sort of large sums of money to do this sort of work they wanted” (EA, 21/03/2011).

As discussed in the sub-section on Impact of Management Measures, these new policy directions were criticised by land managers.

SBC interviewees also confirmed some of the issues identified in Chapter 3 (see Flood Policy) on the power in the 2009 Act to enter into land management agreements with individuals or organisations. First, that the long-term land management agreements between the local authority and land managers are vulnerable to changes in SBC political priorities because investment decisions are governed by a five year budget cycle. Second, that the current legislation gives little leverage to achieve affordable agreements with land managers. Scottish local authorities are allowed to use compulsory purchase powers to implement rural land management techniques when they are included in FPS. However, local authority interviewees did not consider that such powers could be used for rural land management techniques because they had to stand public scrutiny and buying land was expensive. The science underpinning rural land management techniques

is still being developed, and extensive areas of land might need to be used to have a measurable effect on flood generation. Land managers are therefore in a stronger position during negotiations:

“Local authorities are dependent on the good will of the landowners for Natural Flood Management. It is difficult to come to an agreement that would be acceptable because landowners could say no until they have what they want. The local authority may have to consider paying more money to landowners than they would be entitled to” (SBC 1, 09/03/2011).

Third, in addition to the lack of leverage, the local authority observed that negotiations for rural land management represented a new role for local authorities in flood management, but that the resources were not available to develop it:

“The local authority has people to take forward projects, to deal with statutory things and to carry out routine maintenance. But there is more work than resources. The local authority just does not have the resource to meet and negotiate with land managers” (SBC 1, 09/03/2011).

The analysis of documents and interviews identified other means of implementing rural land management techniques at catchment scale. The next sub-section presents results on regulatory instruments.

4.4.3.3. Regulatory Instruments

Several layers of regulations on river and land management are active in the Eddleston and Bowmont-Glen catchment. Under the Controlled Activities Regulations (CAR), SEPA issues consents for activities in or near the water environment. In England, the Water Resources Act 1991 requires EA consent for any activity within five metres of the top of the bank of the main river. SNH in Scotland and NE in England are in charge of regulating human activities in SSSIs and SACs, which both apply to the Eddleston and Bowmont-Glen catchments.

Interviewees from agencies supported regulations because they lowered the environmental impact of human activities. Nevertheless, they believed their role was not limited to enforcement and compliance, but should involved awareness-

raising amongst land managers. This meant actively explaining the purpose of the regulations, while helping land managers meet business targets. The SEPA interviewee in the Bowmont-Glen catchment for example explained how his role was to help land managers find the best management option:

“I feel that my job is to persuade people away from licensed activities that represent most risk to the environment towards alternatives that gets them what they want while falling under a registration or General Binding Rule” (SEPA 5, 29/03/2011).

Implementation of regulations involves therefore a certain degree of negotiation between agencies and land managers. The SEPA interviewee observed the result of its extensive engagement in the Bowmont-Glen catchment:

“The river was never considered as a whole. It was once SEPA started to point this out that certain land owners would begin questioning how valid were works being done by their neighbours. They would then phone me Will this cause a problem to me? That was what really helped us to start talking to land owners and getting land owners to talk to each other” (SEPA 5, 29/03/2011).

Regulations appear to provide a platform for agencies to engage with land managers, and effectively raise awareness of the potential consequences of flood defences on environmental quality and risks.

Land managers' views on these regulations varied greatly between the Eddleston and Bowmont-Glen catchments. In the Eddleston catchment, no land managers had applied to CAR to do flood defences, and none were fully aware of the regulations. In the Bowmont-Glen catchment, all land managers were aware of water and natural heritage regulations, and were closely engaged with agencies with their implementation. The floods appear therefore to have acted as catalysts for raising awareness of the policy environment, and for fostering active engagement between local actors. Overall, by the end of 2010, about five licences were granted on the Scottish side of the Bowmont-Glen catchment, and 13 consents in England (MNV and Tweed Forum, 2010).

After the 2008 floods in the Bowmont-Glen catchment, many land managers on both sides of the border carried out non-authorised flood defences to protect their

properties. In interviews, land managers observed that they had carried out flood defences without contacting SEPA or the EA because they had not been aware of the regulations, or were afraid of not getting authorisation. For example, one land manager explained:

“We did these flood defences probably because the general feeling was that SEPA would not give permission. This is wrong but it was a reflex that some people had. We had no choice because we had water through five or six different channels when it used to be one” (Land Manager 27, 24/05/2011).

As discussed in the sub-section on Impacts of Flooding, land managers viewed regulations as one of the causes of increased flooding and gravel deposition in the valley. In total, nine land managers in the Bowmont-Glen catchment were against any type of regulatory control. They felt it was their right to protect their properties. They observed that the river looked healthy, and agencies had recently decided to protect it for its biodiversity, despite generations of farmers carrying out flood defences. Other land managers however were not necessarily against some form of supervision (17 land managers out of 19); they mainly criticised costs or delays in getting authorisation, in particular in Scotland where fees are attached to licences (unlike England where licences are free). For example:

“We applied for a licence which costs somewhere in the region of £500. It only cost £180 to actually do the job. I mean the whole thing is crazy and impractical. That’s what upsets people more than anything else” (Land Manager 21, 21/05/2010).

English land managers were mainly concerned about the move away from free protection provided historically by public bodies, and about the delays with the administration of licences. Two (out of seven English land managers) criticised the lack of trust as on-site supervision is required even after getting an authorisation. Land managers also criticised the overlap between water and natural heritage regulatory frameworks and the lack of coordination between agencies. For example:

“We had a meeting with SEPA and SNH, and we wanted to take a little bit out just to let things run and SEPA was no problem, great to deal with but SNH put the dampeners on it. There is space to combine them” (Land Manager 15, 17/05/2010).

SSSI and SAC consents run in parallel to CAR and EA consents, which means that one responsible organisation can refuse a proposed activity when another one may agree to it. Cross-organisational processes between SEPA and SNH on the one hand, and EA and NE on the other, are in place to help the joint-consideration of applications. For example, the Scotland's Environment and Rural Services (SEARS) co-ordinates regulatory action on land managers across Scottish agencies (see Agricultural and Rural Development Policies in Chapter 3). Joint site-meetings are also valued by agencies' interviewees because they reduce communication gaps.

Problems still arise. In a standard procedure, SEPA does not have to consult SNH for the lowest tiers of authorisations (i.e. General Binding Rule and registration), but it must consult SNH on the highest tier (i.e. licences). SNH has one month to respond on licence applications. Following the 2008 and 2009 floods in the Bowmont catchment, SEPA used a clause in CAR that allowed a rapid issue of licences in order to ensure that land managers consulted SEPA before doing any work and did not breach CAR. This clause means that SEPA does not have to carry out statutory consultation with SNH, and can issue licences within a week. Responsibility then falls on land managers to consult SNH. This procedure was successfully developed following the 2008 floods in the Bowmont-Glen area, and was then rolled out across Scotland. However, the SEPA interviewee in this catchment noted that land managers often failed to consult SNH:

“People were seeing that as long as SEPA were issuing authorisation, they didn't need to speak to anybody else. I was always telling applicants that Please speak to SNH. SNH would however often find out work had taken place, but that person never contacted them” (SEPA 5, 29/03/2011).

Other issues between CAR and SSSI and SAC consents include regulatory levels where authorisation may or may not be required by each organisation, and the type of information and assessments required to take a decision. In particular, in Scotland, SEPA was moving towards simplifying the licensing system for agricultural flood defences. The idea was to issue a block licence for a whole catchment instead of issuing individual licence to each land manager. Such licensing approach would reduce bureaucracy and costs, while maintaining

regulatory control on activities across the whole catchment. However, the SNH interviewee pointed out that block licensing would not work well within existing procedures for SSSI and SAC consents:

“SEPA could probably allow activities on a block licence across a catchment through CAR if they knew all the activities proposed. You can’t do this that easily with SNH assessments because they are site specific and need to be very detailed” (SNH 3, 29/03/2011).

Similar issues arose in England. The EA and NE set up a meeting with land managers in the Glen catchment after the 2009 floods to improve the clarity and coordination of EA and NE consents. Matrices were developed to clarify regulatory levels and assessment processes. Agencies believed this was a successful collaboration between themselves, and between agencies and land managers. English land managers appreciated the project, but criticised the lack of follow-up. Agencies noted the difficulty of providing adequate long-term engagement due to limitations in resources:

“There is no one organisation that clearly has the remit or the funding to take into account all of the considerations that individual land manager might want us to do. There's always going to be a gap between peoples' expectations and what the public bodies can actually deliver” (EA, 21/03/2011).

Water and natural heritage regulations can prevent the loss of habitats potentially beneficial for flood alleviation, and offer an opportunity to raise land managers’ awareness of the links between rural land management and the water environment. Paradoxically, regulations may create conflicts, but also engagement and dialogue between agencies and land managers. Chapter 5 discusses the engagement process in the Bowmont-Glen catchment in more depth. The next sub-section presents results on economic instruments.

4.4.3.4. Economic Instruments

Water, agricultural, and rural development policies provided the main economic instruments relevant to rural land management beneficial to flood alleviation active in the Eddleston and Bowmont-Glen catchments.

In Scotland, the Water Environment Restoration Fund (WERF) provides incentives for the improvement of the water environment (see Water Policy in Chapter 3). The Eddleston project was the only catchment-wide WERF funded project in the Tweed river basin. Interviewees from agencies, NGOs and SBC observed that WERF had been good to support the initial scoping study. They were nevertheless concerned by the long-term viability of the project. The WERF could only cover capital costs, and could not compensate land managers for lost income, therefore limiting the potential for using the fund for encourage the uptake of rural land management techniques. In England, the EA did not provide similar economic incentives for river restoration⁴⁷.

Agricultural businesses can receive the Scottish Single Farm Payment (SFP), and its English counter part, the Single Payment Scheme, provided eligibility and cross-compliance criteria are met for best farming practices. All land managers frequently mentioned their fears of loosing these agricultural subsidies if they were not actively farming all their land, for example:

“If your ground is covered in gravel that’s not in production and you get penalised on your payment. I have been scraping gravel off the ground in the last six months to get it back to grass and getting it back into production”
(Land Manager 27, 24/05/2010).

This observation provides evidence at local level on eligibility criteria and cross-compliance being potentially counterproductive for the uptake of rural land management techniques, as highlighted in Chapter 3 (see Agricultural and Rural Development Policies). In contrast, the Land Managers Option (LMO) and Rural Priority (RP) schemes in the SRDP, and their English counter-parts in the RDPE, the Entry Level/Upland Entry Stewardship Scheme and the Higher Level Stewardship Schemes (HLS), may encourage rural land management with wider social and environmental benefits. Prompted during interviews, no land managers said they would rule out participating in RDP schemes in the future, and 14 out of 30 expressed an active interest in applying. Interestingly, there were no differences in attitudes between catchments or types of farms (sheep/mixed/arable). In total:

⁴⁷ Since 2012 however, the EA has set up a catchment river restoration fund. See <http://www.environment-agency.gov.uk/research/planning/136182.aspx> (01/02/2012).

- 19 land managers had been engaged previously in the non-competitive schemes (i.e. LMOs, Entry or Upland Entry Stewardship Schemes), and 21 were currently involved.
- 13 had been involved previously in competitive schemes (i.e. RPs or HLS), and 12 were currently involved.

In Chapter 3 (see Agricultural and Rural Development Policies), the competitive RP scheme appeared, to some degree, promising for encouraging uptake of rural land management techniques for flood alleviation. In the Eddleston and Bowmont-Glen catchments, land managers' reasons for participating or wanting to participate in the RP scheme, and HLS, varied. Land managers usually stated that they used the schemes to help fund works they wished to do anyway, for example renovating fences or planting shelter trees. The extra cash helped reduce the burden on personal resources. Diversifying income was also a core objective for 18 land managers. 10 land managers were interested in these schemes to increase amenity, shooting opportunities, or biodiversity on their properties. Seven land managers in particular pointed out that payments in areas at risk of flooding may help reduce financial risk and secure income:

“It is guaranteed money. When it floods we still get our stewardship money whereas with a crop you lose the crop or part of the crop” (Land Manager 30, 25/05/2011).

In the Bowmont-Glen catchment, land managers noted that payments could compensate for losses in their SFP and Single Payment Scheme payments due to losses of good agricultural land eroded after the 2008 and 2009 floods.

Two main barriers to applying to competitive schemes were recurrent in interviews with land managers: land ownership, and the design of the competitive schemes themselves. Relationships between landowners and tenants were generally positive mainly because both had an interest in maintaining land in good agricultural condition. For landowners, this was to maintain the capital value of the land for future rents and secure a good reputation as landlord. For tenants, this was to maintain income levels and business opportunities. However, views

differed slightly on change towards less productive land management. For landowners, this was not necessarily negative because of the long-term value of planting vegetation in terms of increased amenity and shooting opportunities. Tenants pointed out that they were not willing to pay for what they saw as improvements on somebody else's land. Tenants were concerned by: long-term impacts on rents, the fair distribution of capital and maintenance costs, and the long-term distribution of responsibility under agri-environment schemes:

“The tenant farmer is trying to make a living from his land. The tenants won't have the money to invest because as agriculture's been in recession for the last 20 years. If the tenant has to take land out of production one way or another, he wants compensation. The landlord is trying to maximise the rent that he gets from that land. Some landlords won't be that interested in investing money if they are not going to see a return on it” (Land Manager 21, 21/05/2010).

Land managers pointed out many issues with the competitive schemes. First, land managers with farming as a primary source of income strongly saw themselves as food producers rather than as individuals managing trees or land for biodiversity. Four (out of 23) nevertheless agreed with the idea that they could have a role producing wider social and environmental benefits if society paid them to do so.

Second, funding hardly covers capital losses associated with the decline in the productive capacity of the land, income losses from a decrease in commodity production, and costs of capital and maintenance works. This was more commonly an issue for land managers in Scotland than those in England.

Third, Scottish land managers criticised the competitive, bureaucratic and costly nature of the RP scheme which places the burden on the applicant. Four land managers reported failed applications even though they spent a lot of time or money (to pay consultants) in preparing them. For example:

“I've always done applications to previous programmes myself. The SRDP is made so you obviously can't do it yourself. I used an advisor because it's too complicated. If you go along the wrong route, you can waste days” (Land Manager 16, 16/03/2011).

Land managers on the English side were more positive as the scheme is invitation only and led by NE, administrative burden being primarily placed on the agency.

Fourth, competitive schemes may be seen as too rigid and difficult to adapt to local conditions. Riparian vegetation requires, for example, fencing off the river from the livestock, but damages to fences during a flood are not covered by RPs or HLS agreements. Land managers must fence the area back at their own cost. Land managers therefore stressed that schemes with riparian planting can represent a financial risk which might put them off applying to them.

Interviewees from the Tweed Forum had a long experience in helping land managers setting up RP and HLS agreements. They were generally more positive about the English competitive schemes (i.e. HLS) than the Scottish one (i.e. RP). They agreed with land managers that Scotland did not have adequate financial compensation while the English RDP had good incentives (for a comparison, see MNV and Tweed Forum, 2010). Interviewees from the Tweed Forum also observed that RP schemes were biased towards forestry. Forestry being an SRDP national priority, the scoring system advantages them in the RPAC assessment process. Also, they tend to be funded over longer timescales (e.g. up to 15 years). Overall, it influenced the way RP applications were prepared:

“If we have 50 ha of natural flood management and 2 ha of trees, we would still go for trees. What we would tend to design then are wet woodlands. That is a compromise, because I would prefer having wetlands protected for 15 years through the SRDP” (TF 2, 14/11/2009).

Similarly, interviewees from SNH felt that RP procedures had been developed with poor consideration of how measures should be adequately targeted at the local level. It left them with little influence on the targeting and design of final agreements. As the SNH interviewee observed:

“The big issue with SRDP is that the case officer is there to process the application, but cannot really go out and proactively get better value out of that application by suggesting other things to the applicant. This is because when it comes in as a statement of intent or as a proposal, it’s almost cast in stone” (SNH 3, 29/03/2011).

In contrast, HLS in England is managed by NE which can prioritise, select and negotiate with land managers individually before finalising the land management agreement. These results appear to confirm at local level issues with the SRDP

raised in the national overview in Chapter 3 (see Agricultural and Rural Development Policies, and Natural Heritage and Forestry Policies).

4.5. DISCUSSION

Findings from interviews with local actors provide several insights into the dynamics of policy implementation for integrated flood and rural land management. This section discusses results on land managers, as the target population, and their responses to rural land management techniques, and related policy instruments. Results on other local actors, as implementers, their role in encouraging uptake, are then discussed. Lessons for the design of policy instruments and procedures, and their implications for adaptive governance, are drawn.

Overall, land managers in the Eddleston and Bowmont-Glen catchments were generally opposed to rural land management techniques beneficial to flood alleviation (e.g. abandoning land, planting vegetation), a finding that is similar to studies in England and Wales (Parrott and Burningham, 2008; Posthumus and Morris, 2010). However, findings in this research would also suggest a more complex picture. For example, flood defences were preferred to changes in land management where they can be justified economically. Flood defences can represent large costs for land managers, in particular in poorer farming systems such as sheep farming. Investments must be targeted to protect the most productive land and secure income to the business. Land managers were ready to abandon land where such changes led to reduced costs in river maintenance. Overall, immediate costs and securing income were major factors in land managers' decision-making in the sample interviewed, with a general opposition to large investments. These results fit the general observations of Dwyer *et al.* (2007) and Sutherland (2010) on the central role of available resources and income in land managers' decision-making.

Land managers also took into account the side benefits of different types of measures. Land managers in the Eddleston and Bowmont-Glen catchment appear to be concerned by several types of environmental risks, partly explained by the particular environmental context of these catchments (e.g. erodible nature of floodplain). Results nevertheless seem to fit land managers' concerns in general (see e.g. Pivot *et al.*, 2002; Posthumus *et al.*, 2009). Such environmental risk includes river bank erosion, floods (in particular small to medium recurrent ones) and associated gravel deposition, and livestock exposure to hazardous weather. Rural land management techniques could help reduce environmental risks. For example, planting riparian vegetation can reduce the impacts channel and gravel movements associated with flooding. Planting trees could create livestock shelter, in particular for sheep. Such side-benefit can act as an avenue for change towards rural land management techniques, a result coherent with the study on tree belts in Wales by Carroll *et al.* (2004).

Two other factors arose as being influential in the decision-making of land managers: landownership, and attachment to particular landscapes and practices. Previous studies on farmers' decision-making have highlighted the role of landownership (e.g. Garforth and Rehman, 2006). In this research, landownership appears to influence attitudes towards different types of land management. In particular, land managers took into account short and long-term returns, who will benefit, and who will bear responsibility. Landowners could be more interested by planting vegetation and trees than tenants because they could capitalise on the long-term increased amenity and value of the land. Land managers were also attached to particular landscapes, in particular those based on past appearance, a result similar to Parrott and Burningham (2008) regarding saltmarsh creation against coastal flooding. In this research, land managers valued more highly rivers with a single channel, little riparian vegetation, and a landscape dominated by pastures, rather than a landscape dominated by woodland and multiple river channels with rapid lateral movement.

Policy reforms to improve the implementation of integrated flood and rural land management in Scotland may build on the above results, and those on policy

instruments. Results indicate that regulatory instruments have a complex role in increasing the uptake of rural land management techniques in Scotland. Regulatory interventions may be difficult to justify given the general opposition of land managers and the lack of strong scientific evidence on their catchment-wide effectiveness (see also Posthumus and Morris, 2010). However, results from the Bowmont-Glen catchment suggest that even highly contentious regulations, such as CAR, can provide an avenue to foster dialogue between agencies and land managers, and promote rural land management techniques. Posthumus and Morris (2010) observed in England greater compliance to regulations for minimising soil erosion when they were accompanied by awareness-raising programmes. The engagement process in the Bowmont-Glen catchment, and its role in improving implementation, is further explored in Chapter 5.

Economic instruments offer another, potentially more successful avenue to improve implementation. Land managers responded generally favourably to the SRDP. Such economic instrument may cover the costs of effectuating change on the farm, and may help diversify and secure income (at least for the length of the agreement). Land managers also appreciated the side-benefits of some SRDP land management measures (e.g. livestock selfter, amenity). Future instruments, such as land management agreements under the 2009 Act (to be led by local authorities) and the WERF (led by SEPA), would likely be welcomed by land managers if they offered similar opportunities. Findings also suggest that uptake could be increased if SRDP agreements were longer term, had higher payments, and concentrated bureaucratic burden on agencies rather than on land managers. Finally, findings also indicate that SRDP funding worked in synergy with CAR regulatory control on the water environment and flood defences to change land management.

Information provision instruments did not arise as a major theme in the interviews, but they may represent important mechanisms for influencing land managers (Blackstock *et al.*, 2009). Two observations in this research could inform their future design. First, land managers in the Eddleston and Bowmont-Glen mostly relied on personal experience and observation. Second, land

managers were sceptical with regards to role of agricultural practices in increasing run-off, and potentially flooding, a result coherent with land managers in England and Wales (Posthumus *et al.*, 2008). To be effective, awareness-raising programmes may therefore build on farm-level engagement and local pilot schemes, and focus on land managers' understanding of hydrological processes to create a greater sense of responsibility.

The above discussion indicates that the influence of different policies (and their instruments) on land managers can be combined to implement integrated flood and rural land management (e.g. combination of rural development funding and CAR regulatory control). Such observation would support the view stand-alone policies are not necessarily a barrier to successful implementation, but can offer opportunities for innovative interventions. However, two conflicting interactions between policy instruments were also observed. First, the overlap of regulatory regimes (i.e. CAR, EA consents, SSSI and SAC consents), based on different procedures and assessments, potentially resulted in contradicting decisions by agencies (i.e. SEPA and SNH, EA and NE), and/or delays in decision-making. This, in turn, exacerbated opposition from land managers to regulatory control. Second, agricultural economic instruments (e.g. SFP), encouraging maintaining the productivity of land, is inconsistent with rural development incentives (i.e. SRDP), encouraging less productive land management, and water regulations, encouraging retreat and land abandonment in riparian areas. This is consistent with the suggestion of Howlett (2004) that regulations and economic instruments developed separately may produce counter-productive results. Overall, developing stand-alone policies run the risk of producing conflicting policy interventions, and therefore limit the success of implementation.

From an adaptive governance perspective, these results would suggest that independent policy regimes create opportunities for innovative combinations of policy instruments (and successful implementation), and for conflicting combinations of policy instruments (and failed implementation). Findings from interviews with policy implementers (i.e. agencies, local authority, NGOs) indicate that their capacity to fashion successful policy interventions at the local

level was limited. Policy implementers felt they had little leverage to adapt or craft locally relevant policy interventions. For example, national rules on the operation of the SRDP made it difficult to select RP proposals beneficial to flood alleviation and target them appropriately in the landscape. This result provides a local illustration of issues raised in Chapter 3.

Findings also indicate that RP agreements themselves poorly take into account changes in personal, business and environmental contexts. For example, RP agreements do not accommodate easily for dynamic landscapes such as erodible floodplain (e.g. do not reimburse lost fencing from flooding). National rules on regulatory procedures and agreements, initially for CAR, but more so for SSSI and SAC consents, were poorly adapted to the crisis created by the floods in the Bowmont-Glen catchment. Agencies did not have the adequate procedures for implementing regulations in a context where land managers were responding quickly to the disturbances created by the floods. In the longer term, there is also evidence that local engagement may be difficult for agencies to maintain because of the need to justify such investment in organisations that aim to be cost-efficient. Ultimately, this may reinforce the gap of understanding between agencies and land managers.

Findings nevertheless indicate the existence of mechanisms improving implementation of integrated flood and rural land management in the Eddleston and Bowmont-Glen catchments. First, multi-stakeholder (e.g. FLAGS) and multi-agency platforms (e.g. SEARS, RPAC) are in place to improve local decision-making processes. Despite their limitations discussed above, these mechanisms represent typical top-down coordination procedures (Hudson and Lowe, 2004) which scale down national processes to relevant administrative or ecosystem-based management, thereby supporting better coordination at local or bio-regional levels.

Second, the Tweed Collaborative Action, and the Eddleston and Bowmont-Glen projects themselves help improve the delivery of rural land management techniques at catchment scale by increasing local collaboration between agencies,

and pooling resources together to meet local issues. There was, amongst agencies, SBC and NGOs, a common search for reaching collective, multiple benefits. Despite the limitations posed by national rules discussed above, these mechanisms provide good examples of bottom-up, locally led initiatives (Barrett, 2004). In particular, the engagement process between agencies and land managers in the Bowmont-Glen is exemplar of a responsive regulatory regime (Folke *et al.*, 2005), perhaps made possible because floods occurred in a particularly erodible floodplain creating unique conditions for conflict between agencies and land managers. The process nevertheless resulted in the adaptation of regulations (in particular by SEPA through CAR), and ultimately in a catchment management plan. Chapter 5 further evaluates the role of the engagement process in improving implementation.

4.6. CONCLUSION

The implementation of integrated flood and rural land management is still at an early stage in Scotland. Few local projects have been taken forward, and national policies are yet to be adapted to adequately encourage the uptake of rural land management measures at the catchment scale. Local implementers must therefore work with past policy mechanisms, while inventing ways to overcome their limitations.

The research has reported a more in-depth analysis of Scottish local actors' views on integrated flood and rural land management than previous studies, and, more generally, has improved the understanding of local actors' response to relevant policies. Scottish land managers' decision-making on land management is strongly bounded by economic factors and an interest in maintaining the productive capacity of their land. The research confirms however that non-economic benefits of land management change are also taken into account. The research suggests changes to existing policy instruments in order to implement rural land management techniques at catchment scale. Regulatory instruments can provide a powerful avenue to raise awareness and change land management, but

they need to be combined with economic instruments and close engagement to be fully effective. Economic instruments offer an opportunity to land managers to diversify income stream, but they also need to be reformed to be more widely embraced and effective for catchment flood management. The research has identified mechanisms that may improve the work of implementers. Cross-agency and stakeholder decision-making platforms improved local communication and coordination. Implementation may also gain from providing more powers, resources and autonomy to local implementers.

From an adaptive governance perspective, the research suggests that stand-alone national policies provide opportunities for innovative local combinations to influence land managers, but they also run the risk of producing conflicting policy interventions, and therefore of limiting the success of implementation. Also, the debates between top-down and bottom-up policy implementation represent well the tensions between local and higher governance levels in adaptive governance. Providing greater autonomy to local implementers may indeed improve response to local disturbances and concerns. However, devolution may increase the risk of un-coordinated action. The research suggests that statutory-led (top-down) processes therefore do not necessarily increase the risk of mal-adaptation. They need to guide local activities of implementers, while remaining general enough to allow locally-relevant and self-emerging activities. As an example, this may be achieved with setting out general principles of conduct at national level (e.g. ecosystem-based management, strong policy integration), while devolving delivery and control of most resources.

The research focused on the views of land managers, agencies, a local authority and NGOs involved in or living in two catchments welcoming on-going projects on integrated flood and rural land management. Further work could build on these results to examine a larger sample of land managers across Scotland (e.g. using questionnaires). Further work could also explore the implications of on-going and rapid policy developments in flood policy (due to the implementation of the 2009 Act) as well as extend the analysis to other policies (e.g. urban spatial planning). The research focused on land managers and inter-organisational relationships.

Further work could extend the research into intra-organisational dynamics of policy implementation (e.g. SEPA's internal activities to adapt CAR following the floods). Finally, questions used on policy implementation were framed in rather general terms, which may result in the omission of important dimensions of the implementation process, and reduced comparability when questions were not asked in the same way and topics discussed were different. Future research could therefore usefully use more specific questions (through in-depth interviews or surveys) using as a basis results reported in this Chapter as well as theoretical insights from the policy implementation literature.

The Bowmont-Glen project was embedded in a remarkable attempt to improve the implementation of integrated flood and rural land management through an extensive participative process. The next Chapter continues the analysis of adaptive water governance in local policy processes, and focuses on the participative dimension of policy implementation. In particular, it presents a closer examination of the degree to which, and how, the Bowmont-Glen project has facilitated public participation and social learning with regards to flood management.

Chapter 5 Negotiating Integrated Flood and Rural Land Management at the Catchment Level

5.1. INTRODUCTION

The aim of this Chapter is to further evaluate the ideas of adaptive water governance in local policy processes by focusing on the participative dimension of policy implementation. Integrated flood and rural land management is becoming a national and local objective. However, successful implementation remains limited by the design of existing policies. In this Chapter, the potential for participative processes to complement existing policy instruments, and enhance uptake of rural land management techniques for flood management at the catchment scale, is examined.

Research on participative processes for integrated flood and rural land management remains rare. In Scotland, one study by Howgate and Kenyon (2009) evaluates community perception of a river restoration project for flood alleviation. In England, relevant work focuses on river and floodplain ecological restoration, in particular on the planning stage of project development (Adams *et al.*, 2005; Sultana *et al.*, 2008; Mainstone and Holmes, 2010). In the work cited above, public participation is commonly seen as a critical process because it creates a dialogue between scientists, agencies and local communities, which helps improve the selection and uptake of measures.

Research has also been carried out in the broader context of IWRM which strongly promotes public participation in water and flood management (Delli Priscoli, 2009; Everard *et al.*, 2009). Within this, two streams of literature can be identified in the last 10 years. Grounding their approach in power-based

perspectives of participative processes, researchers in the USA (Griffin, 1999; Leach and Peckley, 2001; Lubell *et al.*, 2002; Hooper, 2003; Lubell, 2004; Leach and Sabatier, 2005) evaluate factors conducive to collaboration in water management, finding that participative processes often arose from severe environmental problems and a failure of existing institutions to manage them.

In contrast, many European scholars (Ison *et al.*, 2007; Steyaert and Jiggins, 2007; Mostert *et al.*, 2007; Blackstock and Richards, 2007; Borowski *et al.*, 2008; Bull *et al.*, 2008; Huitema *et al.*, 2010; Lebel *et al.*, 2010; Mostert and Pahl-Wostl, 2010; Huntjens *et al.*, 2011) evaluate the capacity of participative processes to lead to social learning. They argue that improved water management requires a fundamental shift in the way social actors understand water issues and collaborate with each other. Studies have however not showed conclusively that public participation leads to social learning. Lebel *et al.* (2010) observe that learning in river basin management planning mainly focused on the assimilation of facts and knowledge, and hardly goes beyond (e.g. improved attitudes towards other opinions and values). Raadgever (2008) find little evidence that stakeholder participation in flood management planning increases social learning. On a more positive note, Bull *et al.* (2008) find that participation in a river restoration project may have a beneficial impact on social learning. Huitema *et al.* (2010) find that participation in citizen juries may lead to learning amongst some participants, but not all.

The research cited above focuses on the participation of public organisations and interest-groups during the formulation of projects or management plans. Of particular relevance for more local studies is the Ryedale project in the UK which aimed to secure close interaction between expert hydrologists and the local community in the identification of flood risk measures in the catchment (RFRG, 2008). Expert and local participants jointly framed the development of a catchment model during a 12-month collaborative process. For the authors of that project, the modelling not only provided more robust knowledge, but also cost-effective and more socially-accepted knowledge –although actual uptake of

proposed measures was not measured. The study therefore calls for locally tailored modelling and planning processes in flood management.

From an adaptive governance perspective, participative processes and social learning are essential ingredients of building capacity to adapt to environmental changes (Folke *et al.*, 2005; Huitema *et al.*, 2009). Community-led management may better respond to changes in the local context and find adequate solutions. The participation of local communities in decision-making is seen as a way to secure knowledge exchange and collaboration between local actors and experts (Olsson *et al.*, 2004), thereby promoting collective reflection of different views and generate new knowledge, values, and norms (Armitage *et al.*, 2008). Self-emerging, voluntary processes are thought more successful than formal, statutory ones (Booher and Innes, 2010), although questions remain on their adequate institutional design (Kallis *et al.*, 2009). Much European work on participative process for water management has fed into adaptive governance scholarship. However, given their focus on regional level planning, little work has investigated participation in local policy implementation.

Scotland offers a good empirical case to examine public participation in local policy implementation of integrated flood and rural land management. In particular, the Bowmont-Glen catchment was the target of intense interaction between agencies and land managers following two severe floods that led to the inundation of agricultural land and to sediment movement across the catchment. A catchment management plan was developed collaboratively. The concepts of public participation and social learning are used to examine the preparation of the management plan and the negotiation process between agencies and land managers. Theories on public participation and social learning are briefly discussed. The research design is then outlined, followed by a semi-quantitative analysis of local actor perspectives on the participative process, as well as an inductive analysis of those perspectives. The discussion and conclusion reflect on the main factors influencing public participation and social learning, and on lessons learned for adaptive governance.

5.2. THEORETICAL CONTEXT

Public participation in public policy processes usually occurs during policy formation, when policies are jointly produced between state and non-state actors. Emphasis in policy implementation research is on how implementers can achieve policy objectives by improving organisational processes and traditional regulatory, economic and information provision instruments (see Chapter 4). In a governance perspective, target populations - private actors and citizens - and their relationship with implementers in public organisations become more important (Hill and Hupe, 2009). Public participation may become a new policy instrument that can contribute to improving the uptake of policies by target populations (Considine, 2004). Schneider and Ingram (1990) for example suggest that public participation may improve compliance with, or support of, a policy. Alternatively, public participation may enable experimentation and learning about different ways to implement policies.

Public participation can be defined as the *process* “*whereby individuals, groups and organisations choose to take an active role in decision making processes that affect them*” (Reed, 2008, p. 2,418). Justifications for greater levels of public participation in the policy process are embedded in a broader re-conceptualisation of democracy (Munton, 2003; Benn *et al.*, 2009; Renn and Schweizer, 2009). Traditional policy-making relies on negotiations between elected representatives and interest-groups, and may marginalise citizens from the decision making process. Little collective reflection occurs outside elite circles, and those who are most impacted by decisions may be under-represented. Through public participation, citizens can expose decisions affecting them to public scrutiny. The process provides a platform to improve the legitimacy of decisions because citizens can challenge and re-frame decisions against their practical consequences and collective norms. Negotiations may involve a broader range of people in the decision making process, resulting in more accurate understanding of conflicts and solutions, and enhancing collective reflection. Responsibility for decision-

making is moved towards participants which encourages critical judgement, tolerance, and consensus.

Two fundamental objectives appear to underpin participative processes (Collins and Ison, 2009): a re-distribution of power amongst societal actors and a collective re-framing of beliefs and values. The Arnstein ladder of public participation epitomises the first objective. It categorises public participation methods on the basis of their influence on decision-making. At extreme ends of the scale, citizens may only be informed of decisions to having co-decision power (Arnstein, 1969). In water management, the development of participative processes was grounded in this approach, fuelled by civil society opposition to development projects in the 1970s. Public authorities started to use methods such as consultation, interactive workshops, and advisory committees (Delli Priscoli, 2009). In this sense, public participation helps to facilitate negotiation and identify compromises (but not necessarily change beliefs, values or norms).

The second objective of participative processes, one of collective re-framing, is underpinned by the concept of “social learning”. Social learning in contemporary environmental research refers to a process of social change in which people learn from each others in ways that can benefit the wider social-ecological system (Reed *et al.*, 2010). Three outcomes of social learning have been identified in the literature. First, cognitive learning may occur where individuals acquire new knowledge and facts (Huitema *et al.*, 2010). Second, normative learning happens when individuals change their values and norms (Huitema *et al.*, 2010), sometimes with an enhanced feeling of responsibility towards society (Bull *et al.* 2008). Third, communicative learning occurs when individuals improve their ability to examine and reinterpret the intentions and values of other individuals, and increase their capacity to collaborate with others (Bull *et al.*, 2008).

Reed *et al.* (2010) observe that past studies of social learning often only provide evidence of public participation (e.g. the set up of meetings), rather than social learning (e.g. a change in understanding, mindsets, or collaborative potential). In addition, one must differentiate between individual and social learning (Reed *et*

al., 2010). Social learning occurs as an emergent property of interaction in a social group, rather than as an autonomous change in a person's understanding of the world. Finally, learning must be distinguished from its outcomes, such as changed behaviour, improved management or enhanced trust (Muro and Jeffrey, 2008; Reed *et al.*, 2010). Outcomes themselves can be influenced by other factors, such as a change in market conditions or the influence of regulatory or economic instruments.

Overall, successful public participation has proved to be challenging. The process may be manipulated, reinforce privileges, delay action, and increase social distrust (Reed, 2008). Meetings may be dominated by individuals with more resources or more experience of expressing opinion and debating (Munton, 2003). Public participation may lead to biased learning towards dominant viewpoints (Armitage *et al.*, 2008). Reaching shared understanding and consensus may be an unrealisable ideal because of an irreducible plurality of viewpoints, and the inherent difficulty of overcoming conflicting interests, values and beliefs (van den Hove, 2006; Muro and Jeffrey, 2008).

Table 5.1 presents principles set by Reed (2008) and Mostert *et al.* (2007) for successful public participation and social learning. Public participation should at the very least, enable face-to-face discussion. It should secure debates in which participants have equal status. For example, all participants should be able to influence the agenda and the definition of issues to debate. Experts' knowledge should be questioned as critically as local knowledge. For learning to occur, active situations may be required because learning is a process occurring "with the act" (Ison *et al.*, 2007) and through concrete experience. Methods include: participation in practical projects and experiments, visiting trial sites, and collective discussions, deliberation and joint problem solving. Strong leadership is also necessary, built on charismatic individuals, with experience of project management, and with good communication and negotiation skills.

Table 5.1 - Principles for successful participative processes and social learning

Dimensions	Factors conducive to successful public participation (Reed, 2008)	Factors conducive for social learning (Mostert <i>et al.</i>, 2007)
Context	Clear objectives for the participatory process need to be agreed among stakeholders at the outset. Participation needs to be institutionalised.	Timing, purpose, adequate access to resources, political and institutional context.
Representation	Relevant stakeholders need to be analysed and represented systematically.	Stakeholder analysis may help overcome absence of important stakeholders.
Opportunities for interaction	Stakeholder participation should be considered as early as possible and throughout the process.	Informal and formal platforms (e.g. plenary, informal groups, bilateral contacts, field trips).
Methods of engagement	Methods should be tailored to the decision-making context, considering the objectives, type of participants and appropriate level of engagement. Local and scientific knowledge should be integrated.	Open and transparent meetings, using for example dissemination of minutes, joint planning or sometimes bring a plan rather than a blank sheet.
Willingness	Stakeholder participation needs to be underpinned by a philosophy that emphasises empowerment, equity, trust and learning.	High level of commitment, participants must be willing to re-frame their views and to accept collective framing.
Leadership	Highly skilled facilitation is essential.	Status, motivation and skills of facilitators were critical to build trust, establish alliances and train participants in group interactions.

Based on the previous observations, public participation in policy implementation may result in four main outcomes. First, public participation serves policy implementers, resulting in improved compliance. Second, public participation serves target populations, resulting in poor enforcement or modified policy. Third, public participation results in a compromise between implementers and the target population, with no changed beliefs, values or norms. Fourth, public participation results in innovative solutions, and social learning amongst implementers and target populations. Cognitive learning is associated with improved understanding of the implications of a policy for the local context, and vice-versa. Normative learning is associated with closer values, norms and beliefs between implementers (e.g. willingness to adapt policy) and target populations (e.g. increasing support of policy). Communicative learning is associated with a willingness to exchange, debate, and find consensus.

5.3. RESEARCH DESIGN

The Bowmont-Glen project was underpinned by multiple interactions between land managers, agencies, the Scottish Borders Council (SBC) and the Tweed Forum following floods between September 2008 and July 2009. As for Chapter 4 (see Research Design), agencies included: Scottish Environment Protection Agency (SEPA), Scottish Natural Heritage (SNH), Environment Agency (EA), and Natural England (NE). Three studies arose from the 2008 and 2009 floods: one by SEPA on the impacts of the floods on hydro-morphology, one by SBC on the impacts of the floods on the infrastructure of the catchment, and one by the Tweed Forum on the impacts of floods on farms. Following these three short studies, land managers and regulatory agencies in Scotland, followed by English counter-parts, decided to hire a consultant to develop a catchment management plan on fluvial sediment dynamics, river channel adjustment and flood risk management, which was finalised in December 2010 (MNV and Tweed Forum, 2010). Funding came from agencies and the SBC. In parallel to this work, the River Till restoration project in England had been initiated before the floods, and already involved land managers with agencies and the Tweed Forum on the issues of floodplain restoration and flooding.

The Tweed Forum coordinated the development of the management plan, and a committee of seven Scottish land managers was set up to oversee and contribute to the work. The committee represented eight other Scottish land managers and the local community. A similar structure did not exist in England, partly because the impacts of the floods had been less significant in England and partly because of the Till Restoration Project which already involved the same local actors. Two start-up meetings were held in March 2010. The first was organised between consultants and the steering group (i.e. funding partners); the second between consultants and the committee of land managers. Two more meetings were held in April 2010 to present preliminary results to the steering group and all land managers. Land managers were asked to map problems with the river and flooding, their causes and potential solutions. This was followed in May 2010 by meetings between consultants, regulatory agencies and land managers in five

areas of Scotland and England to test recommendations and management options with all land managers.

Overall, the Bowmont-Glen project may represent a positive example of a locally-led, self-emerging participative process in floodplain management where communities are more closely involved in decision-making. Three methods were used to collect and analyse people's experience: documentary analysis, interviewing and Q Methodology. Their role and complementarity are examined in turn below.

5.3.1. Documentary Analysis

The management plan, published in December 2010 (MNV and Tweed Forum, 2010), was used as the outcome of the participative process. Its content was compared to interviewees' views of the project and its outcomes. Documentary analysis involved the evaluation of the types of management measures selected in the management plan, their spatial distribution in the catchment, and the prioritisation of management measures in time.

5.3.2. Interview Analysis

Interviews provided personal, detailed accounts of the project. Interviews carried out with local actors of the Bowmont-Glen catchment in May 2010 and March 2011 presented in Chapter 4 (see Research Design) were used. Interview templates had been informed by the theoretical interest in the participative process. The first set of interviews in May 2010 examined views on problems of the catchment, potential management measures, objectives of the project, and other participants. Data collection occurred in parallel to the meetings led by consultants and the Tweed Forum. It was a good opportunity to assess participants' views on the on-going participative process. Additional questions in March 2011 examined views on the management and outcomes of the project,

local actors' involvement, the content of the management plan, and how to implement it. In total, 44 interviews were performed (Table 5.2):

- 18 interviews were carried out in May 2010. They focused on 17 land managers. Results fed into the development of the management plan. One project officer from the Tweed Forum was also interviewed.
- 26 interviews were carried out in March 2011. 15 land managers and the project officer from the Tweed Forum were interviewed again to evaluate their experience of the project, and their views on the management plan. In addition, interviews were held with other participants of the project, including four from agencies, one from the SBC, one from the Tweed Foundation, two additional land managers, and two other members of staff of the Tweed Forum.

Table 5.2 - Organisations and individuals interviewed

Interviewees	May 2010	March 2011	Interviewed twice
SEPA	-	1	-
SNH	-	1	-
EA	-	1	-
NE	-	1	-
SBC	-	1	-
Tweed Foundation	-	1	-
Tweed Forum	1	3	1
Land Managers	17	17	15
Total	18	26	16

The total number of land managers in the Bowmont-Glen catchment is estimated at around 27, based on a count of farms on the Ordnance Survey map (1:25,000 scale) and discussion with local actors. The sample interviewed covers 19 of the 27 identified. Eight land managers (six farmers and two estates) could not be interviewed because they were not available or not interested in the project.

Land managers included 17 farmers (five landowners, six tenants and six mixed landowners-tenants) and two Estate managers (one on each side of the border). All tenants were renting land from the Scottish Estate. Mixed landowners-tenants

rented fields to the English Estate, neighbouring landowners or other Estates. Landholding sizes were from 186 ha to 1,762 ha, with an average of 692 ha. Farms were classified qualitatively into categories (see Research Design of Chapter 4). Five were mixed cattle-sheep (with no arable) and five were predominantly sheep, while another six included some arable farming. Only one could be classified as predominantly arable. Farms in the upper catchment were dominated by sheep farming, while those in the lower catchment, in particular in England, had higher numbers of cattle and more arable production.

The analytical process for interviews used thematic analysis as described in Research Design of Chapter 4. Interviews were recorded and fully transcribed. All interview transcripts were coded and categorised through NVIVO8. The researcher coded and categorised data from the May 2010 and March 2011 following data collection in order to feed in the Bowmont-Glen catchment management plan. Results presented in this Chapter are based on the successive integration of the coding and categorisation of each round of interviews in the same inductive, thematic based approach. Coding synthesised the substantive meaning of interviewees' answers. In total, 633 codes were created. Each code was associated with 33 first-level categories, themselves associated with five second-level categories (Figure 5.1).

For the purpose of this Chapter, categories were based on what interviewees had to say about their expectations of the participative process, the process of preparing the management plan, its content and how to implement it. Codes for each of the 33 first-level categories were retrieved into word documents. Patterns of agreements and disagreements between codes were explored to test the nature and strength of 1) the internal dimensions of each category, and 2) relationships with other first-level categories. The result was to provide, for each first-level category, an understanding of its main characteristics and how they fitted with other categories.

The choice of using the same thematic structure for all interviews, initially disregarding where the interview was carried out, with whom and when, was to

allow the widest, most varied cross-thematic comparison possible between claims of all local actors interviewed. The risk was however the loss of the contextual nature of the claim or to double count those interviewed twice. Thus, once the main characteristics of each category and how they fitted together were identified, the analysis took into account who made claims and when. This enriched the analysis by bringing the data back into its context.

The researcher had the opportunity to present interim results to local actors through reports (MNV and Tweed Forum, 2010) and, when possible, during the March 2011 round of interviews and meetings (after the interview). The researcher specifically asked for oral and written feedback. Feedback was positive and did not lead to changes in the outcome of the research.

5.3.3. Q Methodology

Access to most land managers in the Bowmont-Glen catchment allowed scope for additional analysis of viewpoints, in particular improving the identification of shared perspectives on the project, their agreement and disagreements. Q Methodology provides a structured and statistically based approach to analyse subjectivity, identify shared perspectives, and measure an individual's affinity with perspectives (Eden *et al.*, 2005). The main advantage of using Q Methodology over, for example, surveys in the case of the Bowmont-Glen project was its capacity to identify shared perspectives in a small sample of local actors. In addition, Q Methodology can reveal patterns in the way people associate opinions, i.e. the internal logic of perspectives (Webler *et al.*, 2009). It is designed to display subjective patterns in small samples more than build a statistically representative image of the wide population. However, results may nevertheless reflect patterns in the wider population (Dryzek and Berejikian, 1993; Fisher and Brown, 2009). Q Methodology was used to understand the degree of similarities and divergences between local actors' perspectives on the development of the Bowmont-Glen catchment management plan, which helped structure and enrich the analysis arising from interviews.

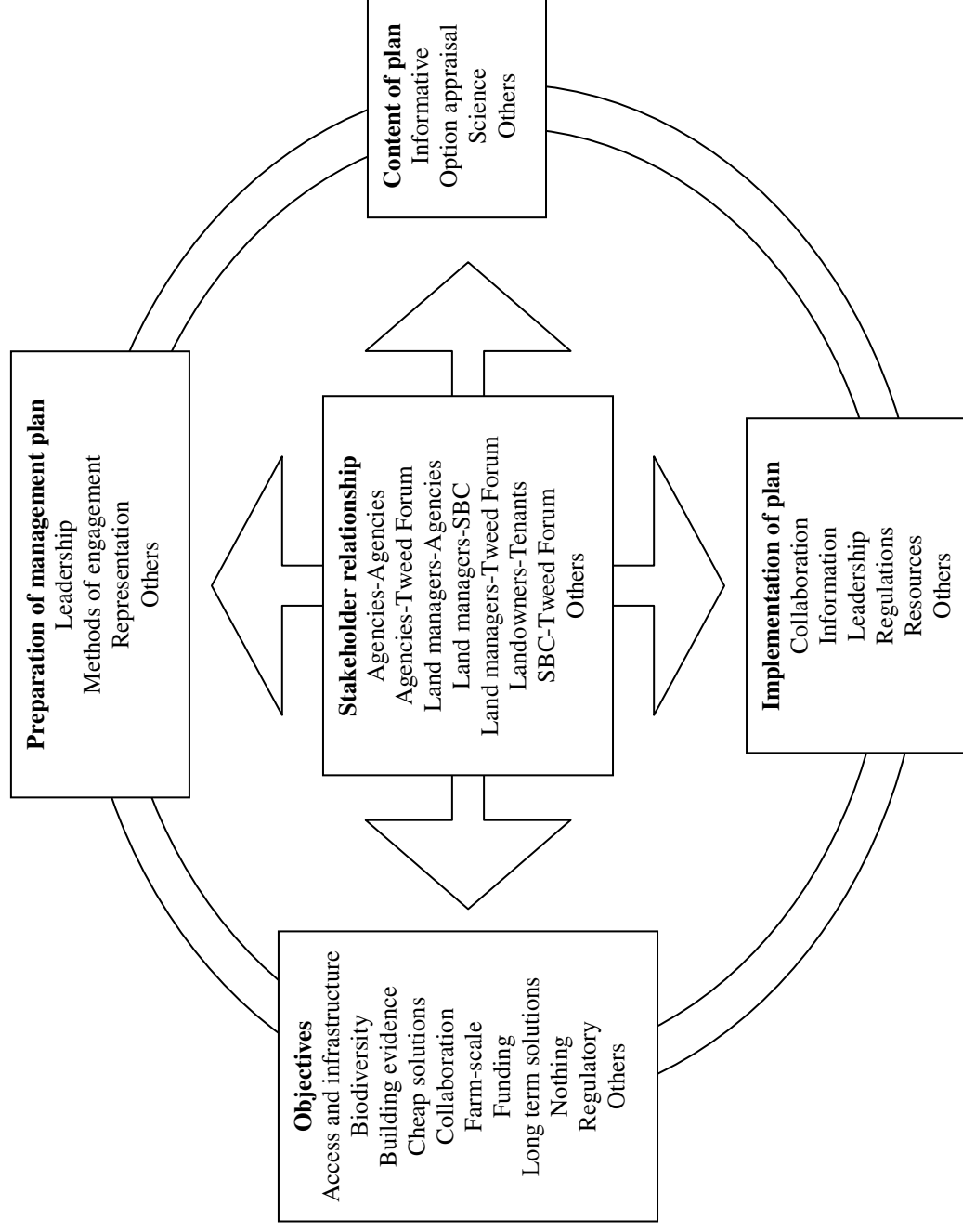


Figure 5.1 - Categorisation of concepts arising from the analysis of interviews, comprising five second-level categories and 33 first-level categories within these

Q Methodology was developed by William Stephenson in the UK and by Brown in North America in the field of psychology (Eden *et al.*, 2005), but has been applied several times to the field of environmental management and policy, for example forest management (Steelman and Maguire, 1999), river basin management (Focht, 2002), public participation (Webler and Tuler, 2006), rural research (Previte *et al.*, 2007), international environmental regimes (Frantzi *et al.*, 2009), flood management (Raadgever *et al.*, 2008) and wind farm development (Fisher and Brown, 2009).

Q Methodology can be divided into five steps (Figure 5.2). First, statements must be generated, encompassing the breadth of views on the topic. Statements can be developed from any available sources of information, such as documents related to the topic of study, previous interviews of people under study, or conference proceedings (Webler *et al.*, 2009). Some researchers create a large number of statements, and use theoretical filters to select a smaller sample of statements (e.g. Frantzi *et al.*, 2009). Others use an inductive approach by categorising available information and selecting a diverse range of statements covering relevant themes (e.g. Fisher and Brown, 2009). Webler *et al.* (2009) indicate that between 20 and 60 final statements are usually used in Q Methodology, and that statements should be meaningful to people, but not necessarily narrow.

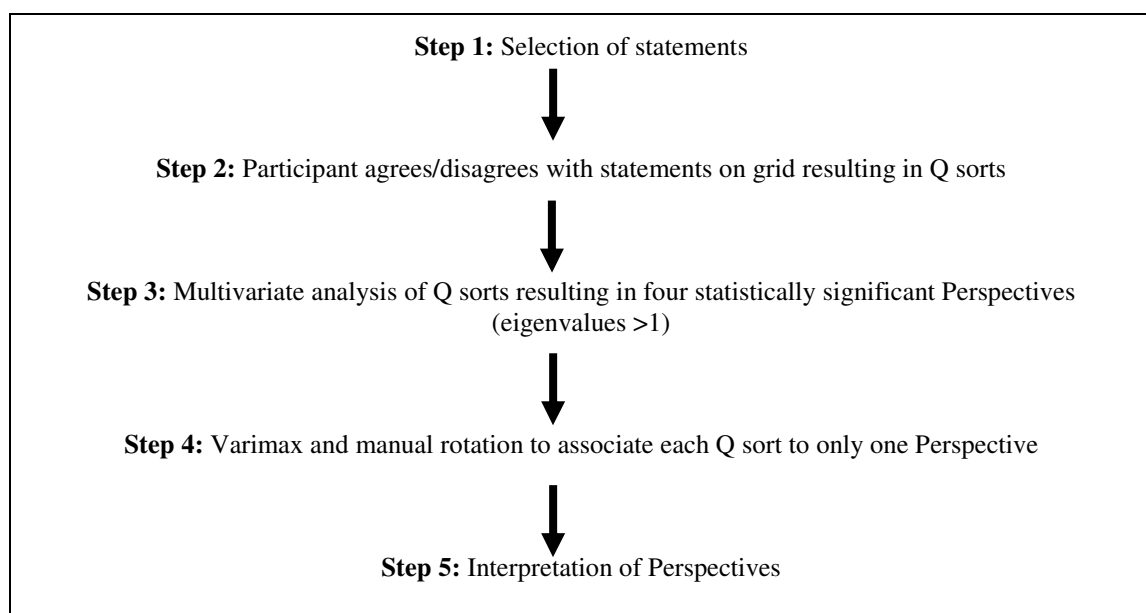


Figure 5.2 - Steps involved in Q Methodology

In this study, statements were generated using 1) the inductive analysis and coding carried out after the first round of interviews with land managers and the Tweed Forum representative in the Bowmont-Glen project in May 2010, and 2) documentary analysis of the management plan, which included further information on land managers' and agencies' perspectives. Themes arising from these analyses included:

- Views on flood risk and related issues: salience of flooding, type of problem faced, cause of the problem;
- Views on management options: effectiveness of management options, quality of management plan;
- Views on governance mechanisms: knowledge exchange, participation, leadership, learning, decision-making, regulation, market incentives, advice provision.

Repetitive views were eliminated. Clear, general views were selected (Webler *et al.*, 2009). After several iterations and discussions with colleagues and Q Methodology experts, 43 statements were selected.

In the second step, participants are asked to sort statements on a grid by how much they agree or disagreed with them (Figure 5.3). For this study, a 9-point scale was used, in which -4 indicated the strongest disagreement and +4 the strongest agreement. It is up to the researcher to encourage participants to base their scoring on a quasi-normal distribution, or allow participants to agree and disagree with any number of statements. Previous research suggests that there is no significant difference between the results obtained by either scoring approach (Brown, 1980; Frantzi *et al.*, 2009; Webler *et al.*, 2009). A normal distribution may ensure participants carefully weigh the pros and cons of each statement, but it is a more time-consuming process. Each individual's overall ranking of statements is known as this individual's "Q sort". In this study, all 26 participants interviewed in March 2011 agreed to prepare a Q sort. All participants also agreed to "force" their scoring on the quasi-normal distribution. Q sorts were coded in two categories to make them anonymous. "LM" represented Q sorts from Land

Managers and “ORG” represented Q sorts from agencies, the SBC, Tweed Forum and Tweed Foundation.

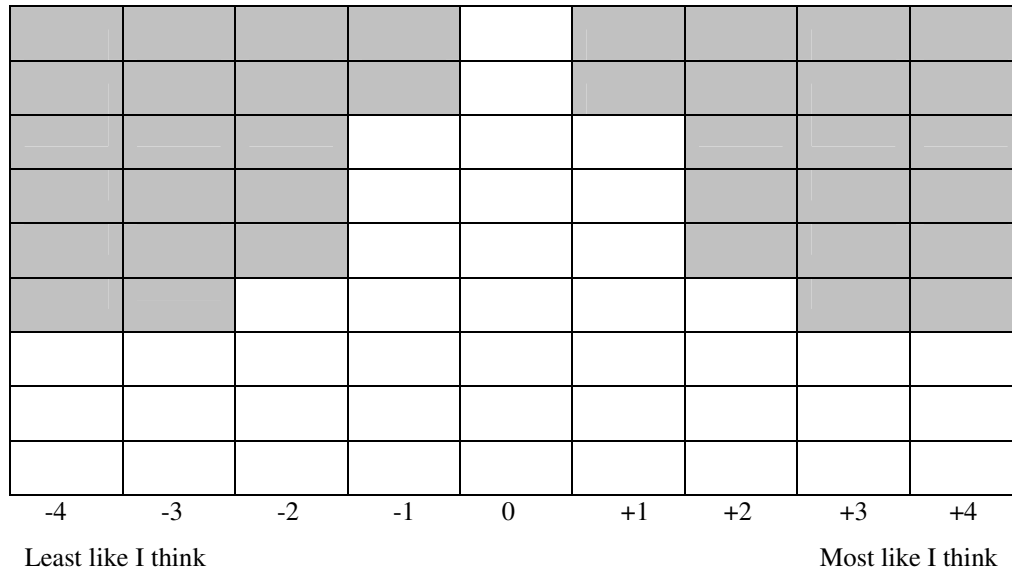


Figure 5.3 - Layout for a normal distribution of statements. *Participants are encouraged to distribute statements on the white boxes in a quasi-normal distribution, resulting in this individual's Q sort.*

Third, Q sorts must be grouped into clusters, or joint “Perspectives”. Clustering of Q sorts is achieved using PQ Method 2.11 (Nov. 2002) software developed for Q Methodology analysis. PQ Method mathematically identifies new variables to explain the variance between Q sorts. These variables represent joint “Perspectives” between Q sorts. The analysis involves three statistical procedures: a correlation matrix (on which the following two procedures are based), a factor analysis (complemented by computed and manual rotation) and computation of factor scores. Perspectives must have Eigenvalues above 1 to be statistically significant, i.e. to explain more variation than one Q sort (Webler *et al.*, 2009). In this study, centroid factor analysis was conducted on the inter-correlation matrix to identify Perspectives as it is more consistent with the premise of Q Methodology (Brown, 1980). The software automatically identified seven Perspectives, of which four had eigenvalues above 1 (Table 5.3).

Table 5.3 - Eigenvalues for Perspectives identified using PQ Method

Perspectives	A	B	C	D	E	F	G
Eigenvalues	5.63	3.83	1.36	1.26	0.99	0.97	0.39

Little guidance or standards exist as to the appropriate relationship between the number of statements, Q sorts (participants), and Perspectives (Webler *et al.*, 2009). In the research referenced earlier, some used more statements than Q sorts (e.g. Frantzi *et al.*, 2009); others based their findings on more Q sorts than statements (e.g. Raadgever *et al.*, 2008). Webler *et al.* (2009) suggest at least three Q sorts for each Perspective. In this research, there were 43 statements, 26 Q sorts and 4 Perspectives, which is balanced and appropriate.

Fourth, ideally, the four selected Perspectives should explain as much variance as possible, i.e. most Q sorts should be associated with one Perspective (Frantzi *et al.*, 2009; Webler *et al.*, 2009). To achieve this, Perspectives can be rotated using the Varimax rotation procedure and/or manual rotation. In doing so the meaning of Perspectives change, but it can also make them more relevant to the analysis because they represent a higher number of Q sorts (Webler *et al.*, 2009). Varimax is an algorithm that rotates Perspectives so that individual Q sorts tend to be associated with just one Perspective. Manual rotation can be used to test and refine a Q sorts' association with each Perspective. A Q sort association with a Perspective is calculated via its "loading". Loadings range from 1 (complete agreement) to -1 (complete disagreement).

In this study, an automated program in PQ Method was used to identify loading (Webler *et al.*, 2009). An examination of Q sort loadings after a Varimax rotation resulted in 21 Q sorts having a significant loading (Table 5.4). Manual rotation was then used to associate the remaining five Q sorts to a Perspective. After two manual rotations, three Q sorts became associated with one Perspective (Table 5.4):

- A first rotation of + 4 degrees between Perspective A and D towards Perspective D resulted in Q sort “LM2” and Q sort “LM9” loading significantly on Perspective D;
- A second rotation of + 4 degrees between Perspective A and B towards Perspective B resulted in “LM 16” loading significantly on Perspective B.

“LM 5” and “LM 15” could not be associated with one of the four Perspectives.

Table 5.4 – Loading of each 26 Q sorts on the four Perspectives. *Bold loadings: significant loadings identified by the automated program in PQ Method software. Underlined Q sorts: associated with a Perspective after manual rotation. Q sorts in italics: could not be associated with any Perspective.*

Q sort code	Loading on each Perspective							
	Varimax rotation alone				Varimax and manual rotations			
	A	B	C	D	A	B	C	D
LM1	-0.01	0.59	0.39	0.09	-0.05	0.59	0.39	0.09
LM2	0.25	0.04	0.37	0.42	0.21	0.06	0.37	0.44
LM3	0.01	0.57	0.18	0.37	-0.05	0.57	0.18	0.37
LM4	0.61	0.22	0.18	0.05	0.59	0.26	0.18	0.09
<i>LM5</i>	<i>0.28</i>	<i>0.38</i>	<i>0.41</i>	<i>0.30</i>	<i>0.23</i>	<i>0.40</i>	<i>0.41</i>	<i>0.32</i>
LM6	-0.13	0.39	0.61	0.22	-0.18	0.38	0.61	0.21
LM7	-0.10	0.10	0.14	0.73	-0.16	0.09	0.14	0.72
LM8	0.21	0.72	0.18	0.24	0.15	0.74	0.18	0.26
LM9	0.38	0.25	0.16	0.46	0.33	0.28	0.16	0.49
LM10	-0.24	0.59	0.26	-0.14	-0.27	0.57	0.26	-0.16
LM11	0.27	-0.02	0.55	-0.02	0.28	0.00	0.55	0.00
LM12	0.13	0.75	0.01	0.16	0.07	0.75	0.01	0.17
LM13	0.19	0.32	0.73	0.04	0.16	0.33	0.73	0.05
LM14	-0.18	0.09	0.31	0.18	-0.20	0.08	0.31	0.17
<i>LM15</i>	<i>-0.06</i>	<i>0.47</i>	<i>0.41</i>	<i>0.25</i>	<i>-0.11</i>	<i>0.46</i>	<i>0.41</i>	<i>0.25</i>
LM16	0.19	0.29	-0.11	0.16	0.16	0.30	-0.11	0.17
LM17	-0.02	0.65	0.04	-0.33	-0.04	0.64	0.04	-0.33
ORG1	0.55	-0.10	0.13	-0.16	0.57	-0.06	0.13	-0.12
ORG2	0.71	-0.37	-0.16	-0.06	0.74	-0.32	-0.16	-0.01
ORG3	0.59	-0.05	0.31	0.00	0.60	-0.01	0.31	0.04
ORG4	0.50	-0.04	-0.04	0.21	0.49	-0.01	-0.04	0.24
ORG5	0.52	-0.01	0.07	-0.04	0.53	0.03	0.07	0.00
ORG6	0.58	0.10	-0.17	0.31	0.54	0.14	-0.17	0.35
ORG7	0.50	0.10	0.00	0.01	0.49	0.14	0.00	0.04
ORG8	0.62	0.23	-0.26	0.13	0.59	0.27	-0.26	0.17
ORG9	0.81	0.15	0.22	0.05	0.79	0.20	0.22	0.10

The fifth and final step of the Q Methodology is to interpret the meaning of the four Perspectives. To help this interpretative process, PQ Method software prepares a number of useful computed outputs. It calculates the “ideal Q sort” for each Perspective by computing the salience of each statement for each Perspective⁴⁸ on a normalised 9-points scale (Table 5.5). These “ideal Q sort” provides a basis for identifying different discourses.

The salience of each statement can then be examined, and compared with other statements in the Perspective and with similar statements in other Perspectives. For example, some statements may have similar salience (positive or negative) in more than one Perspective; other statements may have widely different salience between Perspectives (Frantzi *et al.*, 2009). PQ Method software also identifies statements that distinguish Perspectives from each other⁴⁹. These were used to identify the statements, and underpinning themes and issues, important to each Perspective. Finally, PQ Method identifies statements that are consensual across Perspectives, and statements on which Perspectives most disagree. These were used to identify the statements, and underpinning themes and issues, on which Perspectives agree and conflict most.

Respondents were encouraged to comment on the rationale behind their ranking while creating their Q sort. Combined with data from interviews, this rich qualitative information was used to help the interpretation of Perspectives. The Results section provides a description of each Perspective.

⁴⁸ Salience of each statement is calculated on a weighted average of statements of Q sorts loading significantly on the Perspective. For example, results for Perspective A are based on a weighted average of Q sorts LM4 and ORG1 to ORG9, all of which load highly on Factor A.

⁴⁹ PQ Method identifies statements statistically significant at the 99% confidence level ($P < 0.01$) and those that are significant at the 95% confidence level ($P < 0.05$).

Table 5.5 – Salience of statements for each Perspective as calculated by PQ Method (-4: least agreement; +4: most agreement)

No	Statement	Perspectives			
		A	B	C	D
1	Flooding is a significant problem for my property or business	0	1	4	0
2	Flood risk to livestock and crops is the main problem	0	4	4	-2
3	Flood risk to buildings, roads and infrastructure is the main problem	3	3	4	-4
4	Erosion and gravel deposition associated with flooding is the main problem	0	4	2	4
5	Flooding is worse because of climate change and farming practices	2	-2	-4	0
6	Flooding is worse because the river is not maintained	-4	4	2	3
7	In the long-term, planting trees on hills can reduce flooding and gravel deposition	4	1	0	1
8	In the long-term, planting vegetation along the river can reduce flooding and gravel deposition	2	0	1	0
9	In the long-term, dredging and reinforcing river banks can reduce flooding and gravel deposition	-4	3	2	1
10	The management plan has correctly identified the main problems of the valley	1	-1	3	3
11	The management plan has correctly identified how to deal with the problems of the valley	0	-1	1	1
12	Costs and benefits of management options are distributed fairly between people across the valley	-3	-2	-1	-3
13	Information was easily accessible, clear and easy to understand	-2	-1	-1	1
14	All relevant people were represented in the project and attended meetings	1	0	1	2
15	Participants had a fair and equitable opportunity to contribute to the management plan	2	2	1	2
16	The project was well managed and did not lack leadership and direction	0	0	0	0
17	The Tweed Forum played a crucial role in mediating between participants	4	0	1	3
18	The Tweed Forum played a crucial role in assisting people to contribute to the project	3	3	3	4
19	Landowners and tenants understand better agencies' perspectives	0	-3	0	-1
20	Agencies understand better landowners and tenants' perspectives	1	-4	0	-2
21	The project has enhanced trust between landowners, tenants and agencies	0	-4	0	1
22	Landowners and tenants are committed to implement the management plan	-2	-1	0	-3
23	Agencies are committed to help landowners and tenants to implement the management plan	2	-1	0	-1
24	To implement the management plan, it is better to obtain agreement on an collective basis (across the valley) rather than on an individual basis (farm-by-farm)	3	2	1	1
25	There is not enough information on agri-environmental measures helping to reduce flooding and gravel deposition	-1	-2	-1	0
26	Farm advisors and consultants are good sources of information on agri-environmental measures	0	1	-2	-1
27	The Tweed Forum is a good source of information on agri-environmental measures	0	2	-1	0
28	Governmental agencies are a good source of information on agri-environmental measures	1	0	-1	-3
29	Other farmers (e.g. on the internet, neighbours) are a good source of information on agri-environmental measures	-3	-3	-2	-2
30	Projects such as farm audits or soil, water and nutrient management plans help in identifying problems on the farm and how to solve them	1	-1	-4	-2

No	Statement	Perspectives			
		A	B	C	D
31	Current arrangements for regulating river works are adequate	-1	0	-2	-4
32	River works increasing flood risk and gravel deposition downstream should be regulated	4	1	-1	2
33	River works should be regulated but costs and administration should be reduced	1	0	0	4
34	River works should not be regulated at all because landowners and tenants protect their properties and business	-4	1	0	0
35	There is sufficient and clear information on the regulation of river works	-1	-1	-3	-4
36	Tree planting is acceptable if there is sufficient compensation	-1	2	-1	1
37	Breaching flood banks is acceptable if there is sufficient compensation	1	1	-2	-1
38	Compensation is not necessary for planting vegetation along the river	-2	-4	-3	-1
39	Finding an agreement between landowners and tenants greatly influences uptake of agri-environmental measures	-1	1	3	0
40	The main barrier to applying to agri-environment schemes under the Rural Development Program is the lack of administrative help	-2	0	1	0
41	The main barrier to applying to agri-environment schemes under the Rural Development Program is the lack of adequate compensation	-1	-2	2	2
42	The main barrier to applying to agri-environment schemes under the Rural Development Program is the fear of failing the terms of agreement	-3	-3	-4	-1
43	Breaching flood banks and allowing land to flood occasionally is acceptable if free-insurance is provided (but no annual compensation)	-1	0	-3	-1

5.3.4. Bringing Results Together

Results from Q Methodology were compared with results from documentary and interview analyses in a form of triangulation. Results were enriched by using these different sources of data collection and analysis. The researcher had the opportunity to present these results to local actors at a workshop (November 2011) during which local actors were encouraged to comment orally and were given a written feedback form. Feedback was positive and did not lead to changes in the results.

The Results section presents this analysis as a discussion of results from the Q Methodology, interviews, and the analysis on the management plan. Appendix H links land managers' Q sorts codes (LM) with land managers' interview codes (Land Managers). The discussion presents the comparison of the overall findings with 1) concepts and theories on public participation, and 2) results from research in other contexts in order to test the relevance, fit and broader applicability of the results.

5.4. RESULTS

Results are divided into six main sub-sections. The first sub-section presents the main results of the Q Methodology. The five following sub-sections present a comparison of results from Q Methodology, interviews and the analysis on the management plan. They include: 1) reasons for participating, 2) the management plan, 3) engagement and collaboration during the development, 4) leadership and resources, and 5) the role of the Tweed Forum. These themes arose from the analysis of interviews but were also relevant to the outcomes of the Q Methodology.

5.4.1. Q Perspectives

This sub-section presents the findings of the Q Methodology. Each Perspective is presented, followed by a discussion of the main similarities and differences between Perspectives. Statements referenced in the narrative are those that helped with interpreting each Perspective. Distinguishing statements as identified by PQ Method are in bold in the text.

Perspective A is positively related to one land manager (Land Manager 4), and all representatives of agencies, SBC and NGOs. Perspective A is distinctive from the other Perspectives in many ways. Perspective A strongly opposes the notion that flooding is worse because the river is not maintained (statement **6**), and also opposes the statement that dredging and reinforcement of river banks are good measures in the long-term (statement **9**). Instead, it supports the idea that flooding is exacerbated by land use practices or climate change (statement **2**), and prioritises the planting of vegetation along the river and over hills as a flood alleviation measure (statements **7** and **8**). It supports a collective approach across the river basin to implement the plan (statement 24), and values the role of the Tweed Forum in mediating between participants and in helping people to contribute to the process (statements **17** and **18**). Unlike other Perspectives,

Perspective A strongly supports the regulation of flood defences (statements **32** and **34**).

Perspective B is positively related to seven land managers (Land Managers 16, 17, 18, 23, 24, 25 and 27). Unlike Perspective A, it strongly believes that flood risk and gravel deposition arise from the lack of river maintenance. Rivers should therefore be dredged and river banks reinforced (statements **6** and **9**). Perspective B is the Perspective least likely to agree that the management plan identified the main issues and solutions (statements 10 and 11), and strongly believes the project has not improved understanding and trust between land managers and agencies (statements 19, **20** and **21**). Despite this, Perspective B does not appear to be opposed to measures promoted by Perspective A, such as riparian or tree planting on hills, but compensation is fundamental (statements 36, 38 and 41). In agreement with all other Perspectives, Perspective B values the role of the Tweed Forum in helping land managers to contribute to the management plan (statement 18).

Perspective C is positively related to four land managers (Land Managers 22, 26, 28 and 30). It shares commonalities with Perspective B, namely: flood risk and gravel deposition are worse because the river is not maintained (statement 6); dredging and reinforcing river banks should be carried out (statement 9); riparian or tree planting measures need compensation (statements 36, 37, 38 and 43); and the Tweed Forum helped people in contributing to the development of the management plan (statement 18). However, unlike Perspective B, land managers with Perspective C are more likely to agree that the main problems of the valley were identified in the management plan (statement 10), and that agencies improved their understanding of land managers' issues (statement **20** – although zero score for this statement still suggests ambivalence).

Perspective D is positively related to three land managers (Land Managers 2, 19 and 21). The main problem for Perspective D is with erosion and gravel deposition because of a lack of river maintenance (statements 4 and 6). It disagrees with the other Perspectives dominated by land managers (i.e. B and C)

that flood risk is a priority (statements 2 and 3). The other main difference between Perspective D and Perspectives B and C is that it is more likely to support regulation of flood defences, in particular if costs and administration are reduced, and more information is provided (statement **31**, 32, **33**). As with Perspective C, but unlike Perspective B, Perspective D believes the management plan identified the main problems of the valley (statement 10).

While the description of the Perspectives helps in setting out dominant discourses in the project, one of the most valuable outcomes of the Q approach is to help identify points of agreement and disagreement. Most disagreement arose on: the nature of problems in terms of flood risk or erosion and gravel deposition (statements 2, 3 and 4), the causes of problems in terms of river maintenance or land management and climate change (statements 5 and 6), the nature of responses in terms of maintaining the river or changing land management (statements 7, 8 and 9), and agencies' response in terms of regulatory control and inclusion of land managers' knowledge (statements 20, 21, 32 and 34). Most agreement is reached in relation to the positive role of the Tweed Forum in the management of the project, good leadership, the availability of opportunities to participate (statements 14, 15, 16 and 18), and the need for some sort of collective action in the future (statement 24).

Three main outcomes can be drawn from the Q Methodology analysis. First, the themes of consensus and disagreement suggest that, despite a generally positive review of the process, land managers still had widely differing opinions to representatives of agencies, SBC and NGOs on catchment problems and priorities for tackling them. Second, Perspectives dominated by land managers differed from each other on several dimensions such as views on the response of agencies and the acceptability of different measures and regulations. Third, the examination, in each Perspectives, of 1) the location of land managers in the valley, and 2) the type of farming system (e.g. sheep, mixed, arable) shows that each Perspective is not associated with particular location or type of farm. This suggests that views may not be geographically oriented or sector based.

The following five sub-sections discuss Q Methodology with data from interviews and the analysis on the management plan.

5.4.2. Reasons for Participating

Perspectives from Q Methodology suggest that participants disagreed on the nature of problems and their causes. Perspective A, dominated by agencies, SBC and NGOs, emphasises flood risk to buildings, roads and infrastructure, mainly due to inappropriate land management practices. Perspectives B, C and D, dominated by land managers, emphasise flood risk, erosion or gravel deposition impacts on agriculture, mainly due to lack of river maintenance. Differences of views on the nature and causes of problems even after the development of the management plan would suggest that people engaged in the management plan for varied reasons and with specific objectives, and that engagement did not result in changes to their views.

During interviews, land managers were asked to comment on their reasons for participating in the project. Five land managers were not looking for particular outcomes. The majority of land managers (14 out of 19) clearly showed that their main motivation was to be allowed to carry out flood defences themselves, and see a change in the way regulations were implemented. The feeling was that agencies did not understand the implications of regulations on land managers' businesses. Land managers were in particular keen to stress the importance of taking into account local people's opinions in the management plan:

"I've lived here since 1966 and been involved with the Till and the Beaumont all my life. You get to know how the river behaves. Every flood is different. It doesn't rise and drops as quick. Until you see it, you don't really understand and that's why farmers' knowledge and experience in my mind is very valuable" (Land Manager 30, 25/05/2010).

Land managers thought that local people knew the river better. Local people observe the river on a daily basis. They could provide agencies and consultants with valuable information on how it changed over time, and how floods affected

the river. By participating, they wanted to make sure that their own problems were taken into account:

“There are different problems in different stretches of the river. The best way is to have an onsite meeting for each particular problem and decide where to go from there, be it digging out or reinforcing river banks” (Land Manager 18, 24/05/2010).

Land managers were supportive of the project because it was necessary to take a collective approach to manage the problems of the catchment. In particular, eight land managers mentioned explicit issues with their neighbours, and described how raising river banks on one side of the river could result in more flooding on the other side:

“If I do something here in a big way to maintain things I run the risk of upsetting my neighbours further down. Unless we are all in this together and we have a plan from top to bottom then there is going to be problems between neighbours” (Land Manager 21, 21/05/2010).

For land managers, the management plan would find appropriate ways to protect individual properties, while limiting the impact of flood defences on neighbouring properties, and on the environment.

Agencies were also supportive of the collective approach underpinning the project, but for different reasons. They noted that, while the management plan should reach a balanced set of measures, a catchment-wide, long-term approach (based on land management) is preferable to one that focuses on issues on individual properties (based on flood defences):

“A compromise needs to be reached. There are some works that land managers want in the river but it is important that they also look at what they are doing on the farm holding as a whole and across the catchment. The local communities and us as organisations will hopefully take that away from the management plan” (NE, 21/03/2011).

Agencies saw the management plan as an opportunity to present evidence to support their opposition to certain types of flood defences. Unlike land managers who valued local knowledge, agencies saw scientific assessments as having a central role in supporting good decision-making and informing discussions:

“The report is to get something that is more scientific based on fact and that will actually say: in this area, removing gravel could be beneficial but in these areas it’s not helping and it might make the situation worse elsewhere” (SNH 2, 29/03/2011).

Overall, Q Methodology and interview results suggest that land managers and agencies engaged in the project with a clear interest in influencing outcomes. The project was therefore an avenue to present their viewpoints, and hopefully reach a compromise. Other actors such as the SBC and NGOs emphasised, during interviews, their role as observers or facilitators, rather than active decision-makers. The next sub-section will examine views on the management plan itself.

5.4.3. Views on the Catchment Management Plan

Chapter 4 showed that land managers in the Bowmont-Glen and Eddleston catchments generally preferred flood defences, while agencies, SBC and NGOs were keener on land management changes. Perspectives similarly reveal entrenched differences. Perspective A prioritises the planting of vegetation along rivers and over hills and opposes dredging and reinforcement of river banks. Perspectives B, C and D of land managers prioritise dredging and the reinforcement of river banks. Participants in Perspectives A and B are less likely to value positively the quality of the management plan compared to those in Perspectives C and D. Perspectives A and B may be associated with participants who feel that the management plan does not meet their expectations (for different reasons), for example in the selection of measures (e.g. not supporting their favoured measures). Perspectives C and D may be associated with participants who are more satisfied with the compromise.

The final version of the Bowmont-Glen catchment management plan (MNV and Tweed Forum, 2010) was released in December 2010. The management plan divides the catchment into six zones. In terms of land management measures, it suggests a mix of buffer strips across the landscape, drain blocking, woodland plantation and hedgerows in gullies, creation of riparian areas, wetland restoration, and abandonment of riparian and floodplain areas to the natural

dynamics of river. Extensive woodland planting is suggested in upland areas. Riparian tree planting is proposed over large areas of the floodplain. Flood defences are proposed in 10 “hot spots”. Flood defences include: removing and redistributing sediment, re-profiling of banks, reinforcing embankments, green bank protection, and the introduction of large woody debris to slow water flow. An overview of the management zones and location of prioritised areas is given in Figure 5.4. An example of suggested measures in one management zone is provided in Figure 5.5 and detailed proposals for one hot-spot site in Figure 5.6.

Interviews explored views of participants on the management plan. The majority of land managers (15 out of 19) were broadly positive about it. They noted that the plan was generally informative and represented the valley fairly. It tried to strike a compromise between land managers and agencies by recommending different types of options:

“There are several options available, not just “this is the only thing you can do”. It’s done the whole area, from top to bottom. They’ve come up with a lot of solutions which I would never have thought of” (Land Manager 22, 14/03/2011).

Land managers had nevertheless several criticisms. A majority of land managers (12 out of 19) pointed out that the plan was repetitive, sometimes impenetrable, and would therefore need follow-up to clarify the recommendations:

“There is so much technical information in here that we don’t seem to have any very short and easy conclusions that everyone can understand. There is lot of technical jargon. I don’t know if that’s intentional because people don’t really want anything to happen so they’re hiding behind the science or whether it’s because it’s more complex than we appreciate. All I want to do is have half a dozen points of what we can and can’t do” (Land Manager 16, 16/03/2011).

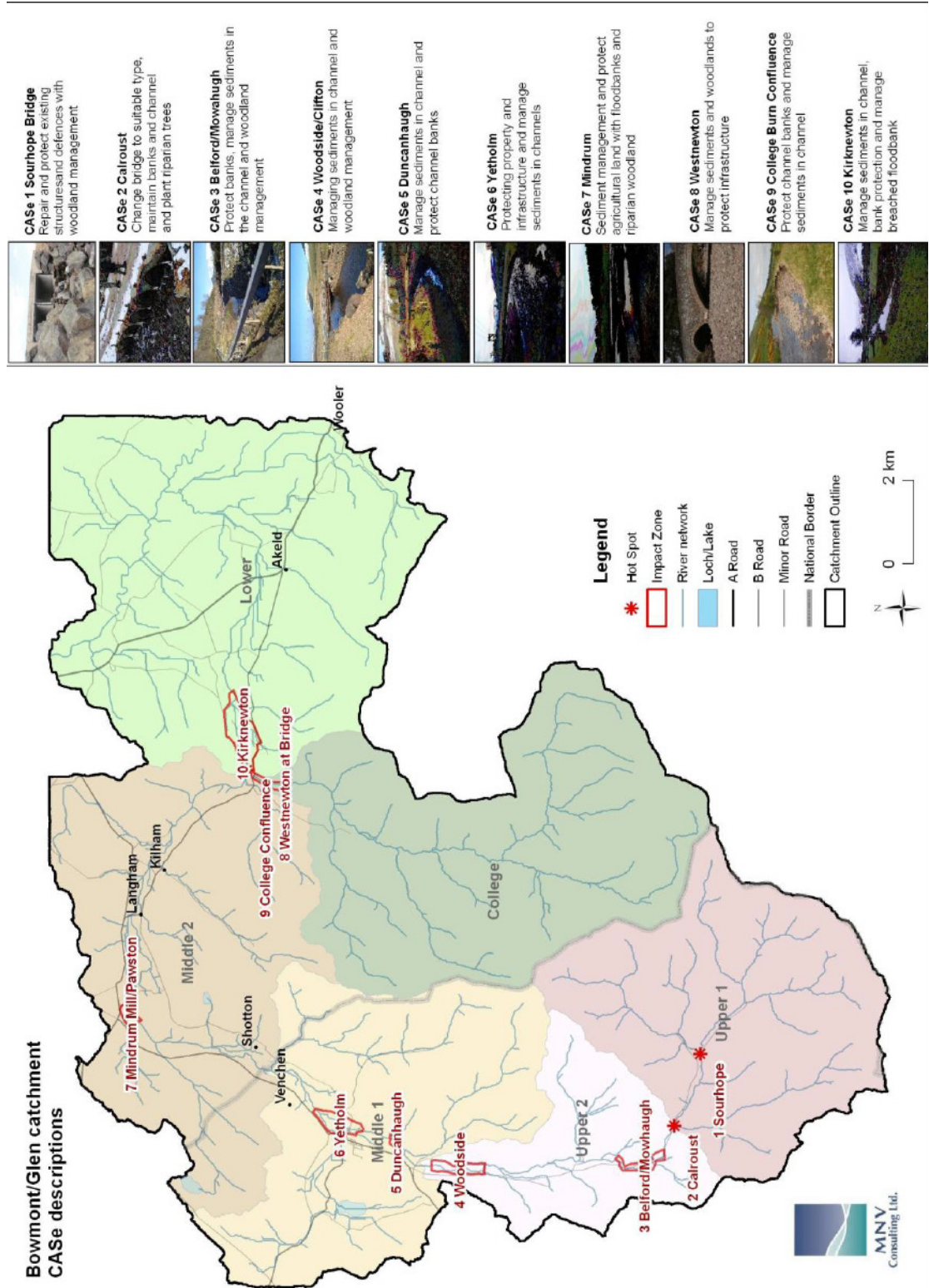


Figure 5.4 - Suggested management zones and hot-spot sites in the management plan (MNV and Tweed Forum, 2010)

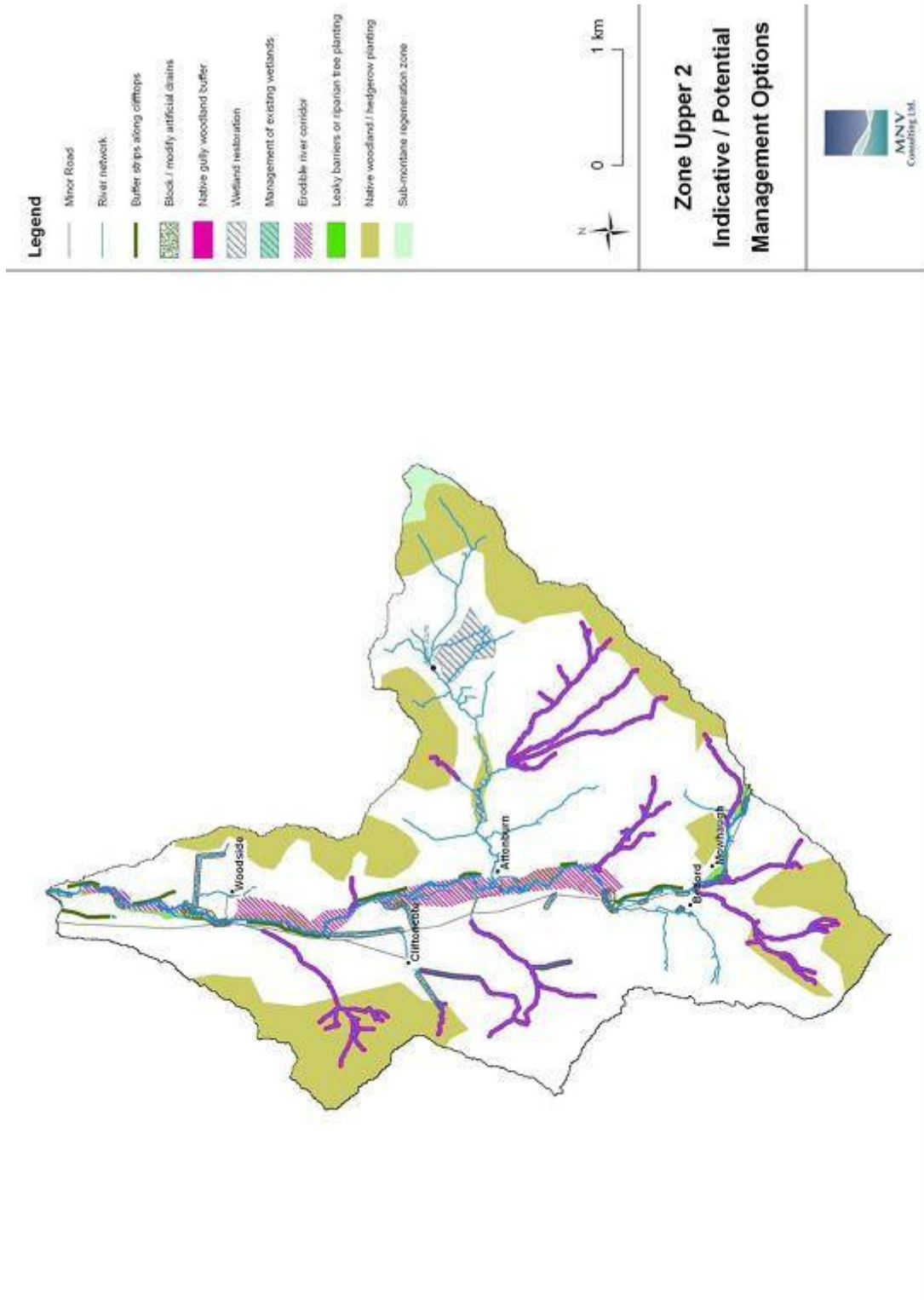


Figure 5.5 - Suggested flood alleviation measures within one of the management zones (MNV and Tweed Forum, 2010)

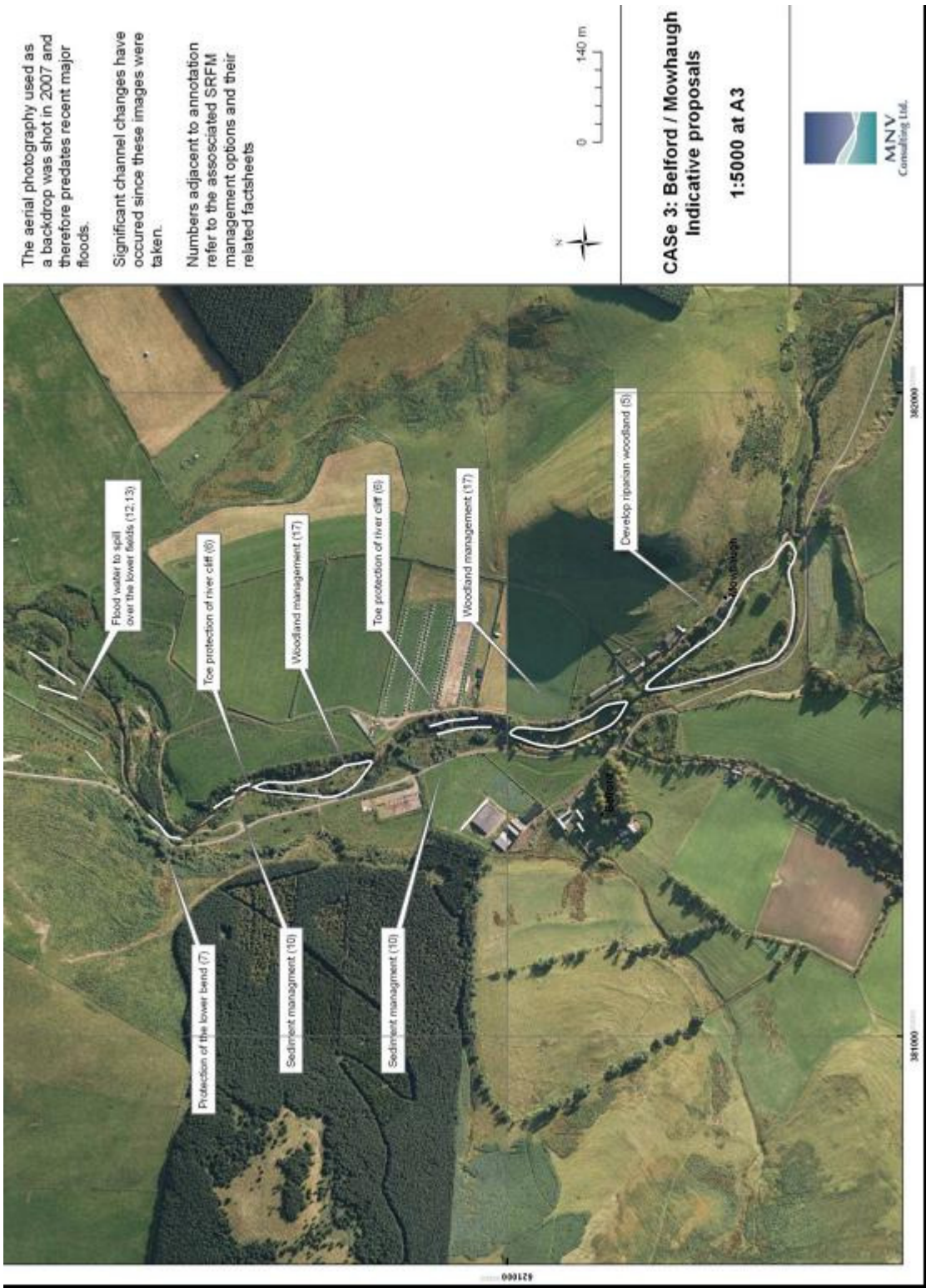


Figure 5.6 - Suggested measures for flood alleviation in one of the hot-spot sites (MNV and Tweed Forum, 2010)

Four land managers were openly critical of the plan and considered it was a waste of money. They believed doing flood defences based on local knowledge was the only appropriate way forward. Five land managers feel the plan only made recommendations for a few, targeted sites that did not concern them:

“The bits I have read mainly seem to concern major work on the river. It didn’t mention anything about how to control the water on most of our ground but just says: “let it flood”. They only focused on certain areas” (Land Manager 23, March 2011).

“There are six main problems but there are 40 other problems are more important to each individual farmer on their part of the river as opposed to the whole basin. A big problem down at Kirk Newton does not bother me” (Land Manager 27, 17/03/2011).

It is possible that this feeling was exacerbated by the identification of hot spots in the management plan. Land managers whose properties were not targeted by hot spots may feel that some properties were prioritised over others, in particular where the justification for using flood defences includes the protection of agricultural land. The management plan clearly prioritises securing access to homes and farms in the selection of hot spots. For example, out of the 10 hot spot sites, eight included protection of public and private bridges and roads, and four included protecting buildings and electricity/wastewater infrastructure. However, five sites also included an objective in reducing gravel deposition and channel movement across agricultural fields.

In interviews, land managers had mixed views on the scientific basis of the management plan. Four land managers directly questioned the validity of the methods used by consultants, for example:

“Everyone has an opinion and people who study these things have more knowledge than me obviously but I don’t believe their knowledge will sort the Bowmont out. Our neighbour has for example put a big barrier down the side of his cattle corral where it used to flood. That is going to make a huge difference to us here but they won’t have taken that into the equation” (Land Manager 14, 16/03/2011).

Other land managers did not dismiss scientific knowledge, but they practised what could be called “latent scepticism”, that is they were not convinced, but yet accepted the management plan. Two land managers specifically insisted that land

management changes should be accompanied by monitoring to justify their implementation.

Agencies noted that the plan contributed to raising land managers' awareness of land management measures, and in particular of regulations on the water environment:

"People read the report before they phone me and are able to tell me what is proposed for their reach. It may seem to land managers that the report has been a massive investment for something that they will tell you was common sense. But from my point of view it helps because they understand the reasons why we're against certain activities before they phone me" (SEPA 5, 29/03/2011).

Agencies nevertheless pointed out that the plan could not overcome all disagreement. For them, the plan proposed too many flood defences, and did not embrace enough the promotion of land management measures. The management plan lacks information on the impacts of measures on species and habitats protected by biodiversity regulations, and how to minimise those impacts. This meant that there was not enough information in the management plan to secure consents for the recommended flood defences:

"There should have been a section on how to minimise damage when work is carried out and information on most sustainable options. When authorities will evaluate applications there won't be any information on how this is going to impact on protected features. We need to manage expectations of the communities because this may be the recommendation, but it doesn't necessarily mean that that is feasible in terms of the legislation" (NE, 21/03/2011).

NGOs also criticised the lack of attention to environmental impacts of proposed measures, but they also pointed out that the management plan was a compromise and that people are therefore unlikely to be fully satisfied. Finally, unlike agencies and NGOs (and diverting from Perspective A), the SBC interviewee was pleased with the management plan because measures relating to roads and bridges were included.

Overall, results from the Q Methodology, documents and interviews indicate that the management plan does not represent a joint-perspective, where participants

agree on problems, causes and solutions. The management plan is a hybrid perspective, a compromise between participants crystallised by a catchment approach with targeted flood defences in hot spots. To better understand the dynamics leading to the plan, the next sub-section presents results on the engagement process.

5.4.4. Engagement and Collaboration

Findings from Q Methodology Perspectives suggested that the project had been fair and well managed, but that views were more sceptical about whether understanding and trust had increased. Land managers in Perspective B in particular were the least likely to have a positive view of the outcomes of the project.

During interviews, the majority of land managers (12 out of 19) were broadly positive about the engagement process with agencies and consultants. 11 land managers appreciated in particular one-to-one site-meetings with the Tweed Forum. Land managers observed that engagement had been constructive and open, and helped improve relationships with agencies:

“It has not been easy to speak to agencies in the past. In many cases the only way to contact agencies is by phone, and you didn’t know who was on the other end of the phone. It has been good to all come together with these meetings. We have been able to put names on faces and found a lot of these people are quite approachable” (Land Manager 30, 15/03/2011).

In Scotland, all land managers highlighted the improvement in their relationship with SEPA. In particular, they appreciated the pro-active approach of the local agency representative, and the help in preparing proposals for obtaining Controlled Activities Regulations (CAR) authorisation:

“SEPA first came and said: don’t do anything or we will prosecute. Now they are coming saying: what would you like to do and we will sort the licences. The whole mindset has changed, it is a lot clearer and the information is there. I would now quite happily phone the current person in SEPA. He knows what I am talking about and he will say: I will come and see you. You are not scared to phone in case they say: you can’t do that or we will prosecute you” (Land Manager 22, 14/03/2011).

Five land managers raised issues with the land managers' committee. Most criticism arose from people not involved in the committee who noted the lack of feedback:

"They have never come to say anything to us and we have never heard anything about what was happening at the meetings or the outcomes, It would be better if there was somebody who would come round at the end of the meeting or types the minutes and post them out to people that were not attending" (Land Manager 23, 14/03/2011).

One land manager felt that there had not been enough collective discussions on measures selected in the management plan. Too many decisions were taken through one-to-one interaction between land managers and agencies instead of being discussed collectively. Land managers on the English side of the catchment, as well as some agencies and NGOs, did not always feel involved in the management plan from the outset. Attention had been focused on the Scottish part of the catchment. The most common source of frustration mentioned by land managers (10 out of 19) however, was the lack of action on the ground during the development of the management plan. The project focused too much on planning, rather than decision-making:

"There is far too much bureaucracy with the involvement of so many different organisations. There are too many plans, too many ideas, too much paper and not enough action on the ground" (Land Manager 17, 14/03/2011).

In Scotland, on the suggestion of the SEPA representative, land managers delayed their application for consents on flood defences until the catchment management plan was produced. However, as pointed out by one agency, the plan took longer than had been imagined to be prepared:

"You thought the publication time of the report was near, and you would say to people at meetings to wait before making any decisions. People were very patient but it went on and on. People were just in desperate need to get work done in some cases" (SEPA 5, 29/03/2011).

In addition, land managers pointed out that national priorities and legislation limited the ability to compromise, and that agencies' representatives were not the key decision-makers:

“We were dealing with people in the EA at quite a low level who were afraid to say yes or no. The EA has hired a liaison officer because they were so poor at communicating. Nice chap, but I am not convinced he knows what he is looking at. It would have been better to have one of their engineers, somebody who was not a mouthpiece and could interpret their own legislation” (Land Manager 2, 17/03/2011).

Agencies were positive about the engagement process, and believed it resulted in an improvement in how land managers communicated with agencies. The SEPA representative believed land managers were more willing to question their practices, and contact the agency:

“Communication has improved along the whole valley. They don’t phone to complain or get their neighbours into trouble but they will phone if they think their neighbour is doing some work that may affect them during a flood. It has made people think of the system as a whole rather than: this is my section of river, this is what I need to do” (SEPA 5, 29/03/2011).

Agencies in England felt that they did their best to engage with the local community because many meetings, workshops, and site-meetings were organised. They noted that this was resource intensive and difficult to sustain. Some agencies decided to devolve the responsibility of engaging with land managers to one agency due to limited resources, but also to limit the number of agency representatives at meetings. Agencies valued that type of collaboration with other agencies, and were keen to highlight the successful partnership in place in and across the Borders, as discussed in Chapter 4. Such collaborative work does not come free of problem. For example land managers asked questions about SNH policy during meetings, but only SEPA was present:

“It was decided that SEPA would represent SNH and Rivers Tweed Commission and would then feedback information back. People did communicate well but I could have done with backup at some meetings. For example, the day we went up and down the valley was a long day. I was asked questions about Sites of Specific Scientific Interest I don’t know how many times. And I can’t answer those questions. I can only tell people that I’ll speak to SNH on their behalf” (SEPA 5, March 2011).

Overall, results from Q Methodology and interviews indicate that the project offered the opportunity for local actors to interact with each other, leading to an improvement in the relationship between some land managers and agencies. The engagement process nevertheless had issues of representativeness (e.g. not

involving all land managers and agencies at different stages of the project) and legitimacy (e.g. unclear role for collective decision-making versus individual decisions and how to represent another agency). There was also scepticism on the willingness and capacity of other participants to change their views and positions. The issue of willingness and capacity is further examined in the following subsection.

5.4.5. Leadership and Resources

Perspectives show a consensus on the need to take a collective approach during implementation. However, all Perspectives also believed agencies and land managers had a low commitment to implement the management plan (although agencies ranked their commitment higher than land managers ranked agency commitment). Data from interviews suggest that views on regulatory and economic barriers influence land managers and agencies' attitudes to the implementation of the management plan. Data however also suggest that barriers can be overcome with strong willingness and leadership. This is presented below.

During interviews, only two land managers did not want to take forward any measures in the management plan because they did not feel they had any problem or did not feel an obligation to downstream individuals. However, the majority of land managers (17 out of 19) expressed some willingness to implement some of the measures. In particular, 15 (out of 19) wanted to carry out flood defences, and nine (out of 19) were willing to change their land management. They were nevertheless sceptical about agencies' and other land managers' commitment to implementing any measures. With regards to flood defences, land managers believed agencies' representatives were bound by regulations decided at a higher level in the organisation:

“It has to tie up with quite a lot of people but I am not sure whether people have the time or the inclination to do anything. One or two probably will, one or two won't and one or two will sit on the fence” (Land Manager 26, 14/03/2011).

“Bureaucrats are impractical people and have never managed land. Yet they are telling us how to do it. There are one or two guys at local level who are pretty good and have an understanding like the current person in SEPA. They have an understanding because they come out but the line managers who make the rules and regulations haven't got any practical experience” (Land Manager 21, 14/06/2011).

Interviews with agencies do suggest that regulatory approval of flood defences is likely to be a difficulty. Agencies observed for example that the management plan only contained guiding principles. Applications for authorisations need further interpretation and detailed information. They were keen to be constructive and to actively engage with land managers to design flood defences that meet regulatory requirements. However they also noted that the initiative must come from land managers and that the agencies would not actively implement the plan:

“It's down to land managers to come forward with the proposals. We have been looking at areas that could benefit from engineering work, bank protection or planting to give an early indication of whether we accept that in principle, or we might need more information, or how to reduce potential impacts. People then design their proposal around that which makes the assessment a lot easier” (SNH 2, 29/03/2011).

Another barrier for land managers is the lack of spare resources. Land managers stressed the economic constraints faced by farm businesses:

“There are bits in the report that do help but again it is about who is going to pay for this. At the moment we are not all sitting on a lot of money” (Land Manager 26, 14/03/2011).

Land managers hoped the plan would help obtain grants for flood defences, although they believed this was unlikely. Interviewees from agencies and the SBC did believe that fewer resources would be available for rural flood defences and access improvements in the future as resources were being re-directed nationally to protecting critical infrastructures and urban areas.

The issues with implementing changes in land management were explored in depth in Chapter 4, of which lack of resources was an important factor. All nine land managers who responded favourably to land management changes were not willing to fund land management measures if no external funding was available.

Land managers felt that costs would be imposed on them when the intended impact would be to benefit downstream properties:

“I would consider doing things but I would not do it out of the kindness of my heart. I would need some sort of compensation. Why should farms up the valley, especially tenant farms, spend thousands and thousands of pounds to benefit anybody else?” (Land Manager 15, 16/03/2011).

Despite comments from interviewees on regulatory barriers and resource constraints, flood defence works and changes in land management went ahead during the project. By the time the management plan was finalised, five licences had been issued by SEPA in Scotland for flood defences, and 12 consents by the EA in England. Licences and consents were provided for removing gravel, re-profiling river banks, and constructing flood embankments. The majority of these works were privately funded by land managers. Works were also funded by SBC to repair and protect public bridges and roads. The EA, NE and Tweed Forum were also engaged with land managers in restoring a flood bank in England with a wooden palisade to prevent debris washing onto a field while allowing the dispersal of flood waters. The project also involved setting back flood banks to improve flood protection for hamlets while allowing greater flooding over the floodplain. These works were funded by a combination of EA flood defence, rural development and specific River Till restoration project funding.

In terms of land management change, in England, six land managers were or became enrolled on the Higher Level Stewardship Scheme (HLS) of the Rural Development Programme for England (RDPE). Agreements included some land management changes for flood management, such as the setting back of flood defences, and reverting riparian arable land and intensively grazed land into more extensive grazing systems. In Scotland, five land managers became closely involved in proposals for changing land management. Two land managers in the middle part of the Bowmont Water became enrolled on the Rural Priority (RP) scheme of the Scottish Rural Development Programme (SRDP) to plant riparian vegetation. Three other land managers, one in the lowest part and one in the upper part of the Bowmont catchment, were applying for rural development funding for riparian planting and tree planting over hills. One of those three land managers

was taking forward a combination of riparian planting vegetation (to restore habitats and to serve as a barrier against gravel), and regular dredging (to prevent the aggradation and destabilisation of the river channel). The approach was an innovative blend of dredging and riparian planting in order to exploit synergies (see also Chapter 4).

In interviews, the five land managers in Scotland who were involved in changing land management did not use the areas targeted for land management change intensively. Two of them mentioned that they changed their mind on how they used these riparian areas because of the recurrent flooding and gravel deposition. All four land managers appreciated the secure nature and diversified source of income provided by rural development funding. Two also highlighted the responsibility of land managers in responding positively to the management plan in a collective way:

“I am pleased co-operate because I feel I should do my little bit when people have put effort and time into the project. We could sit up here and say I am fine and it is not bothering me because the impact is farther down in the valley. But if you do not try to do something at the source it doesn't matter what you do farther down. Everybody has to do something” (Land Manager 22, 14/03/2011).

The Tweed Forum or NE had been actively engaged with land managers in preparing proposals and trying to obtain funding. The Tweed Forum stressed the importance of taking time to understand land managers and building trust. A long-term relationship, regular contact, meeting broader concerns of land managers about their business, and providing practical experience with examples and pilot projects were critical factors:

“It is just spending the time and listening to their concerns, not just on the particular pieces of land we would want, but also on the whole farm. We need to find ways to address those. If they feel they are forced to taking some decisions to some artificial timescale then they are less likely to come on board. It is about having a constant contact, a familiar face, somebody they know they can get to no matter what” (TF 3, 03/11/2010).

“If you get one key landowner on board, you can persuade others. Just get one scheme up and running and they can see what is involved. For example, we started riparian fencing 15 years ago. When farmers saw it didn't have an impact it spread down the valley” (TF 1, 14/11/2010).

Land managers indeed noted that the management plan needed a close follow-up with each participant to discuss the best options for each property. It was difficult for them to identify, in the management plan, what is suggested at each property. They were also looking for help on finding external funding:

“The best thing is to make an appointment to see each family individually. It would have been much better than printing that report if they just came, show you a map of your farm and your bit of the river and said you should do this, this, this and we could help you with finding money or whatever” (Land Manager 23, 14/03/2011).

Overall, this sub-section discussed perception of regulatory and economic barriers may hinder implementation. It was shown that implementation may be taken forward with enough willingness and leadership. In the context of integrated flood and rural land management, where one of the aims is to ensure a catchment-wide approach, the question these results raise is how to drive a collective approach to implementation. The next and final sub-section will explore this dimension and discuss the role of the Tweed Forum.

5.4.6. The Role of the Tweed Forum

All Perspectives saw the Tweed Forum as having a crucial role both in mediating between participants and assisting people in participating. This suggests that the Tweed Forum played a pivotal role in the project. During interviews, 13 land managers (out of 19) expressed a good opinion of the Tweed Forum. They appreciated that there was one point of contact that could inform on the project’s development:

“The Tweed Forum person is very good. He is our point of contact. He knows how to talk to you in a language you understand and can translate that into the jargon that they need” (Land Manager 25, 14/03/2011).

Seven land managers thought the Tweed Forum offered useful help on grant applications for land management change. They valued its capacity to reach a compromise on where to make changes on their property, and to improve applications for funding. They saw in the Tweed Forum an opportunity to avoid costs and time normally associated with those applications:

“The Tweed Forum would have to drive applications because a lot of farmers haven’t got time to sit down. The amount of paperwork that you have to do to apply to get some of these things is just cost prohibitive” (Land Manager 21, 14/03/2011).

One land manager compared the Tweed Forum to agencies and other organisations who do not live in the valley, revealing that the Tweed Forum may not necessarily be seen as a grass-roots, local organisation. One land manager clearly expressed criticism towards suggestions of the Tweed Forum representative on potential land management changes:

“He was not realistic about what is nice and what is practical in terms of farming. It’s not rude it’s just that he has his mindset on things looking beautiful and being wonderful. He suggested planting trees in some of these bits up to here but the water doesn’t get to these places” (Land Manager 14, 16/03/2011).

This might reveal the tension between the dual roles of the Tweed Forum in this project. As an independent facilitator, the Tweed Forum has to strike a balance between land managers’ and agencies’ interest (e.g. should not prioritise land management over flood defences). In contrast, its broader agenda in promoting integrated catchment management means that they have an interest in prioritising changes in land management to improve the water environment.

During interviews, agencies expressed positive views on its work. They emphasised its contribution to deliver successful partnerships by acting as a coordinator and ensuring information is distributed amongst parties:

“This type of project is quite a difficult one to pull together because you are trying to balance different requirements. The Tweed Forum has done the work quite successfully because we now have the report. They have a lot of experience in running those types of projects, bringing people together and delivering good quality work to a reasonable timescale” (NE, 21/03/2011).

The Tweed Forum represented for agencies a good vehicle to better integrate various issues and policies on the ground. For example, in Scotland, the Tweed Forum could better target applications for rural development funding, and encourage collective applications (issues identified in Chapter 3 and 4):

“The Tweed Forum does the whole catchment, Southern Uplands Partnership the uplands, Borders Forest Trust the woodlands. We fund all three in various ways. They each have one person responsible for going out and encouraging collaborative rural development applications. We meet together to make them work strategically in targeting places” (SNH 2, 29/03/2011).

Agencies also stressed that the Tweed Forum could act as an independent, honest broker between agencies, and between agencies and land managers. It could build and maintain contact and trust with land managers, and help them understand the policy framework. The Tweed Forum could therefore help agencies in reaching an acceptable compromise with land managers:

“Having Tweed Forum involved was a good vehicle for the project. The level of trust that land managers have for the Tweed Forum is far higher than for EA or NE. We are seen as people with more of an agenda. Tweed Forum is seen as an honest broker. They can build relationship with individual land managers. It takes time to build that level of trust and communication” (EA, 21/03/2011).

Overall, the Tweed Forum has multiple roles for land managers and agencies. It must therefore not only manage its relationships with land managers, but also expectations from agencies and other partner organisations. In this light, its voluntary, non-statutory driven nature appears important because building trust and relationships, as well as ensuring independent facilitation, can be prioritised over implementation and the delivery of organisational targets if needed.

5.5. DISCUSSION

The Bowmont-Glen project offered a very good opportunity to explore the dynamics of public participation in the implementation of integrated flood and rural land management, where implementers (i.e. agencies) meet with target populations (i.e. land managers) to debate and negotiate the use of flood defences and rural land management techniques. The discussion presents an evaluation of the process with regard to the degree it helped improve policy compliance, met land managers' concerns, and led to collective learning. Factors influencing those dynamics are identified and discussed.

Findings in the Bowmont-Glen suggest that the project met, to some extent, the targets of agencies, which were to improve compliance with regulations regarding the water environment, and increase uptake of rural land management techniques. Land managers for example contacted agencies to carry out flood defences which were then conducted according to regulations following authorisations. Several land managers also entered rural development schemes and implemented rural land management techniques. Findings also suggest that the project met some of the issues of concern to land managers. Agencies adapted regulatory policies to reduce the amount of bureaucracy, speed up administrative procedures, and streamline decision-making between agencies. Many land managers were allowed to carry out flood defences to protect their properties. Overall, public participation during implementation worked in synergy with water regulations and rural development funding. The results would therefore support the idea that public participation contributed to improving local uptake of, and compliance with, policies (Considine, 2004).

Findings in the Bowmont-Glen catchment suggest that the participative process had limited success in fostering cognitive and normative learning, with slightly better results for communicative learning. In terms of cognitive learning, implementers and the target population still strongly disagreed on the nature of the catchment's problems, their causes, and the appropriate solutions. Land managers prioritised flood defences and local knowledge, while agencies supported land management changes and scientific knowledge. Yet, despite this broadly negative picture, there is evidence of changes in factual knowledge. For example, participants appreciated the plan for capturing the characteristics and issues of the whole catchment. Alternative, innovative measures were also crafted, such as mixing flood defences and rural land management changes (e.g. willow planting with gravel management), suggesting some blending of scientific and local knowledge (Reed, 2008).

In terms of normative learning, agencies and land managers alike did not believe that the process changed or improved each other's understanding. Agencies still prioritised the protection of the water environment, and land managers the

protection of their properties. There was little evidence that land managers developed a feeling of responsibility, as Bull *et al.* (2008) would argue should be the case, about the impact flood defences may have on neighbouring or downstream properties. Despite this, some land managers engaged in land management changes partly based on the idea that such action may be beneficial for the local community. The project appears to have made them aware of what they could do to contribute, and may therefore have reinforced the sense of responsibility.

In terms of communicative learning, agencies and the target population generally reported good willingness to meet, exchange views, and find compromises with each other. Agencies and land managers alike believed the process had been fair and offered an equitable chance to participate. They valued a collective approach and believed that the project broadly improved relationships. Yet, many participants were not satisfied with the compromise obtained in the management plan, and were not necessarily willing to collaborate and implement it.

Overall, results in the Bowmont-Glen catchment would not suggest an “*irreducibility plurality of standpoints*” (van den Hove, 2006, p. 11) since some learning occurred amongst some participants in what is, comparatively to other studies (e.g. Bull *et al.*, 2008) a relatively short period (i.e. three years of engagement since the 2008 floods, one year for the management plan). Yet, results suggest that learning is a challenging target, and is perhaps unlikely to occur adequately in situations of policy implementation at local level. Good levels of relational learning, but low levels of cognitive and normative learning, would suggest that the participative process, during policy implementation, is mainly valuable for improving the relationship between implementers and the target population, opening up opportunities for willing individuals and organisations to drive forward issues relevant to them, and to find compromise. It would suggest that it is less good at fostering new understandings and encouraging the building of consensus and active support to policy.

In comparison with the Ryedale experience (RFRG, 2008), it appears that the interaction between “experts” and the local community (in this case land managers) in the Bowmont-Glen was less successful in fostering more “socially-accepted” knowledge, perhaps because the local community was not as involved in the production of knowledge as in the Ryedale study (where it actually helped develop the model itself). However, the Ryedale study focused on understanding and knowledge and was more disconnected from practice, while the present study measured uptake in a context where implementation of land use change was a direct outcome of the study. It is therefore possible that the implication of the new knowledge being immediate, in particular by those affected by it, strongly influenced the attitudes of the local community towards the new knowledge itself.

Examining more closely factors influencing the participative process and social learning may better explain these outcomes. Has the participative process in the Bowmont-Glen met the requirements for successful negotiation to identify compromises, as outlined by Reed (2008) in Table 5.1? On the one hand, the objectives of the management plan had been agreed collectively between implementers and land managers. Although the management plan was not a statutory process, it was to some extent “institutionalised” as governmental agencies were closely engaged. In addition, several opportunities for interaction occurred, and methods of engagement were clearly tailored to the participants involved with the use of community meetings, workshops, area-based discussion groups, and one-to-one site visits. The land managers’ committee provided a mechanism for collective discussions and decision-making, and, in most cases, information flowed appropriately between committee members and those outside the committee. There was also an effort to include, and combine, local knowledge with scientific expertise.

On the other hand, the process did not closely engage all relevant implementers (e.g. SNH) and land managers (e.g. on the other side of the border in England) from the outset. Also, tensions arose because the land managers’ committee was sometimes not consulted prior to individual agreements being made on measures which could affect neighbouring land. Agencies, NGOs and land managers

generally preferred discussions on an individual basis. While there was an attempt to empower land managers, a philosophy of trust and learning was clearly lacking. Implementers and the target population alike were highly sceptical of each other's capacity and willingness to change. Agencies believed that land managers were unlikely to adopt land management changes because it conflicted with business targets (e.g. food production) and viability. Land managers believed agencies were bound by regulations and organisational targets (e.g. prioritising investment in urban areas).

Similarly, has the participative process in the Bowmont-Glen met the requirements for successful social learning, as outlined by Mostert *et al.* (2007) in Table 5.1? Many observations regarding conditions for successful negotiation can be applied for social learning, for example the institutional context of public participation, adequate representation, and wide opportunities for interaction and influencing the process. However, for social learning to occur, other conditions must be met, in particular adequate timescales and a high level of commitment to re-frame views with a collective one. As discussed above, the Bowmont-Glen project appears to have provided good opportunities for interaction and adequate methods of engagement, but was less successful on the issues of representation, and a philosophy of trust and learning. In particular, it seems that perceptions about what Blackstock and Richards (2007) call "non-negotiables" (i.e. positions not open for change) led participants to focus on compromises rather than reflecting on and questioning their own knowledge, values and beliefs.

Reed (2008) suggests that highly skilled facilitation is an essential element for successful public participation. Similarly, for social learning, Mostert *et al.* (2007) emphasise the status, motivation and skills of facilitators. Findings in the Bowmont-Glen project strongly support that idea in the context of policy implementation of integrated flood and rural land management. Successful agreements were reached in particular where land managers and agencies had been pro-active in trying to reach compromise. In one case, an innovative approach (e.g. mixing riparian planting and gravel removal) was developed in particular thanks to the leadership of the land manager. Critically, the leadership

of the Tweed Forum underpinned the project. It secured continued dialogue and exchange of information between agencies and land managers to identify compromises on some flood defences, and opportunities for land management changes.

This leaves the question of the added value of a voluntary catchment organisation like the Tweed Forum for implementing integrated flood and rural land management, in comparison with a process led by statutory agencies. The voluntary nature of the Tweed Forum appeared important because the organisation could prioritise independent facilitation over achieving policy targets and coercive implementation. The NGO was not seen by agencies and land managers as a threatening organisation. In Scotland, the Tweed Forum helped overcome the problems that SNH face when trying to target rural development funding adequately in the landscape, and negotiate agreements with land managers. In contrast, despite their statutory nature, agencies successfully managed to engage with land managers. For example, SEPA and the EA managed to improve their relationship with land managers, and NE enrolled several land managers on rural development funding. Overall, a voluntary catchment organisation like the Tweed Forum may help mediate between conflicting actors (“honest broker”), and may drive forward policy implementation where institutions fail to do so (e.g. encourage a catchment approach to land management change if not part of any statutory agency remit).

From an adaptive governance perspective, findings reported in this Chapter suggest that using participative processes for the implementation of integrated flood and rural land management would be beneficial for two main reasons. First, public participation may help reach compromises between implementers and target populations, thereby improving the fit of national policies at local level. Second, public participation may foster collaboration with willing land managers, thereby improve co-management at local level (Olsson *et al.*, 2004). In that regard, the Bowmont-Glen is a good example of a local community responding actively to a perturbation, and working with public organisations to find appropriate responses.

Findings also suggest two institutional designs for increasing adaptive governance at local level. First, a voluntary catchment organisation such as the Tweed Forum can help overcome, to some extent, limitations created by statutory and policy arrangements. It may improve communication, exchange, and provide the leadership for reaching of compromises and some social learning. Second, fostering more in-depth reflection and learning during policy implementation is more challenging, and would require more flexible policy arrangements. For example, greater local autonomy for policy implementers to work outside regulations and organisational targets, and build long-term relationships with target populations, could be beneficial. Close linkages with national policies must nevertheless be maintained. This is consistent with results reported in Chapter 4.

5.6. CONCLUSION

The Bowmont-Glen project provided a useful research context to examine an innovative, self-emerging participative process between implementers and land managers for integrated, ecosystem-based flood management. The research reported here is a more in-depth analysis than other studies of a participative process on the implementation of integrated flood and rural land management. Also, unlike other studies, it focuses on the interface between agencies and land managers, rather than regional level river basin management planning.

The research has demonstrated that the participative process in the Bowmont-Glen project led to improved policy compliance, greater uptake of rural land management techniques, and better relations between agencies and land managers. In particular, participative processes worked in synergy with other policy instruments such as regulations and economic instruments. In contrast, low levels of cognitive and normative learning were observed which suggests that public participation in policy implementation may have a limited role in building consensus and active support for policy, at least over a short period. Success was built through a mixture of good opportunities to interact and adequate methods of

engagement. Social learning was limited, in particular by shortfalls in the engagement process (e.g. adequate representation), non-negotiables, and lack of resources. These factors cannot be overcome within the implementation process alone, but needs simultaneous change at other levels of governance (e.g. organisational targets, regulatory requirements), as well as a more fundamental questioning of deep-seated social features (e.g. business targets, entrenched views). The research therefore suggests that social learning is a challenging target in participative processes during policy implementation.

From an adaptive governance perspective, the research supports the use of participative processes during implementation to improve the fit of national policies, and their uptake, at local level. Public participation may also support co-management between implementers and local communities at local level, but care is needed on the design of the engagement process and the context within which it is embedded. The research reported here suggests two potential mechanisms to support participation (and co-management) and social learning. A voluntary catchment organisation may improve communication, exchange, and provide the leadership for reaching of compromises and learning. Greater autonomy for policy implementers may help build successful relationships with target populations, and improve long-term policy implementation. Care again must be given with regards to the level of autonomy, or, more precisely, the maintenance of strong linkages with higher levels of governance, in particular if fostering cognitive and normative learning is a core objective of the process.

The research focused on the views of land managers, agencies and NGOs involved with or living in one catchment. Further work could build on these results to test results in other contexts. This research used documentary analysis, interviews and Q Methodology, all of which are suited for small sample sizes. Further work could benefit from utilising other methods, such as surveys and statistical techniques to further test relationships identified in this research. Finally, this research was conducted over only a short period of time. Other work could increase the validity of the findings with pre- and post-event evaluations, and could further test changes over a longer time.

This Chapter has complemented Chapter 4 in examining implementation of flood and rural land management policies at the local level. The next and final Chapter will provide an overall discussion linking results from Chapters 2 and 3, which focused on the national level, and Chapters 4 and 5 which focused on the local level.

Chapter 6 General Conclusions

In a world characterised by on-going, severe water issues, it becomes ever more important to examine what mechanisms can foster sustainable water management. This research posited that principles of adaptive water governance combined with the use of concepts from the policy sciences literature can help examine features in society fostering the formulation and adoption of new, potentially more sustainable policies and practices. The policy transition towards integrated, ecosystem-based flood management, in particular integrated flood and rural land management, in Scotland was selected as a case-study for empirical examination. The enactment of the Flood Risk Management (Scotland) Act 2009 represented the crystallisation of a new policy direction towards integrated, ecosystem-based flood management after several years of gestation. Its examination provided a rich historical experience of policy dynamics. In addition, its ongoing implementation represented a remarkable opportunity to closely observe mechanisms supporting the reform of the policy framework and the adoption of new practices.

This final Chapter starts by presenting an integrated synthesis of the results of Chapters 2-5. The main conceptual and methodological contributions of this research are then outlined. Methodological limitations and avenues for further research are discussed. Finally, the thesis ends with policy recommendations for improving the adaptive governance of integrated, ecosystem-based flood management in Scotland, and elsewhere.

6.1. SUMMARY

Chapter 2 addressed the first research question (p. 27) on the formulation of Scottish national policy on integrated flood and rural land management. The research draws on the concepts of policy learning and change, and an in-depth analysis of policy documents and interviews with national policy actors. A long period of stability characterises Scottish flood policy with progressive change

across the 1990s and 2000s associated with more frequent flood events. Over that period, several new social actors became interested in flood management but remained external to policy circles. A more inclusive and deliberative venue was created in 2002 after severe flood events across the country. This offered a new platform to question existing practices and test implications of new ideas in a Scottish context. In particular, activities carried out to define Sustainable Flood Management (SFM) were examined. The Chapter presented how ambiguity around SFM enabled agreement and collective action. Institutionalisation came with political and institutional changes external to flood policy (i.e. devolution, elections and transposition of EU Directive) which offered opportunities to key policy and political leaders to accelerate the rate of adoption of SFM. However, the failure to develop a shared perspective on the concept suggested that conflicts during implementation were possible.

Chapter 3 addressed the research questions on the implementation of integrated flood and rural land management at national level, how it is embedded in national flood, water and various rural land management policies, and what mechanisms can enhance integration. The research drew on theories on policy integration, data from interviews, and documentary analysis. The level of integration was found to be very low, not only in formulating the general idea that rural land management at the catchment level can help alleviate flooding, but also in the design of policy instruments and decision-making processes. As currently formulated, policies were likely to be highly prioritised towards sectoral objectives. First attempts at rationalising incentives in water, agricultural, rural development, natural heritage and forestry policies through the development of a single rural development programme faced significant criticisms. Participative and learning mechanisms, as well as statutory duties, with the potential to foster further integration in the long-term were identified. Further integration appeared to face significant challenges, such as the opposition of vested interests, or more technical factors such as uncertainties in scientific evidence and the lack of adequate resourcing. Therefore, significant policy reforms for integrated flood and rural management are unlikely to emerge the near future. This called for more attention to implementation

processes at local level, and how local actors were exploiting existing opportunities.

Chapter 4 addressed the research question on the implementation of integrated flood and rural land management at local level, in particular how it is embedded in local policies and viewed by local actors, and what mechanisms can enhance local adoption. The research drew on theories on policy implementation, and a combination of documentary analysis and interviews in the Eddleston and Bowmont-Glen catchments. Ideas of integrated flood and rural land management appeared to fit poorly with the interests, values, beliefs and practices of land managers. Responses to policy instruments encouraging new practices range from full, pro-active adoption to open challenge and conflict. Land managers did not respond to one policy instrument, but often to their combined stimulus. Implementing integrated flood and rural land management would likely be opportunistic, and require one-to-one negotiations between implementers and willing land managers. Implementers were highly constrained by the existing, fragmented institutional framework. Formal streamlining processes (i.e. joint responsibilities, consultative procedures and management planning) and locally specific processes (i.e. non-statutory strategies, projects and meetings) were set up to foster collaboration, combine multiple sources of funding, and engage actively with land managers. Results highlighted the potential role of participatory processes between implementers and land managers in increasing uptake of integrated flood and rural land management.

Chapter 5 furthered the research questions on local implementation of integrated flood and rural land management, in particular what mechanisms increase local adoption. The research drew on theories on public participation and social learning, and a combination of documentary analysis, interviews and Q Methodology in the Bowmont-Glen catchment. The participatory process led to improved policy compliance, improved uptake of rural land management techniques, and improved relationships between implementers and land managers. Leadership by a local voluntary catchment organisation in particular helped improve the participative process. However, rather than developing a shared

perspective and ending social conflict, most participants remained attached to their original views. The participative process was hindered by a lack of adequate representation, entrenched views and a lack of collective commitment, arising from perceived non-negotiables of other participants. Participative processes may help foster new practices, but are unlikely to, at least in the short-term, result in new, joint perspectives. To do so, greater local autonomy of policy implementers would be needed as well as time to reconsider deep-seated social features (e.g. business targets, entrenched views).

6.2. CONTRIBUTION OF THIS RESEARCH

Overall, the thesis improves the understanding of adaptive water governance in public policy processes, and provides evidence supporting, adjusting and refuting various ideas within the adaptive governance literature. In this section, the methodological, conceptual and empirical contributions of this research are presented. The implications of the research contributions are then outlined.

Past research on the policy process proved to be a rich and valuable body of work to help explore the formulation and implementation of integrated, ecosystem-based flood management. In particular, it provided constructive theories to examine general principles of adaptive governance in an empirical context. To date, most research had used studies on policy change (Chapter 2), social learning and public participation (Chapter 5) to examine ideas of crisis, leadership, and community-led management. This study further evaluated the contribution of these concepts, and built on additional ones, in particular policy learning (Chapter 2), integration (Chapter 3), and implementation (Chapter 4). These concepts were well suited to explore opportunities and challenges associated with ideas of polycentric and participatory governance, and different modes of policy interventions.

Starting with the idea of polycentric governance, research findings in Scotland fit observations in other countries that flood management is now involving a greater

number of social actors at multiple levels of governance (Chapter 2). Their involvement is clearly becoming an important element of the decision-making process. However, in Scotland, bureaucratic control through central and local government and agencies remains the central mode of action in developing, implementing and reviewing policies, programmes and interventions on flood management (Chapters 3 and 4). The polycentric nature of current flood management is mostly related with the higher number of responsible public organisations following the creation of semi-autonomous, governmental agencies.

The Scottish experience supports assertions that horizontal and vertical polycentric governance can improve the adaptability of water governance systems. Horizontally, multiple actors with decision-making power (i.e. public organisations responsible for separate policies, or stakeholders engaged in decision-making process) may encourage greater reflexivity in the development of policies, and may improve policy implementation. The research has for example shown that new actors in flood policy (e.g. NGOs, politicians) put greater pressure on traditional policy actors (e.g. civil servants, experts) to abandon the status-quo (Chapter 2). Having multiple policy regimes may foster innovative combinations of policy interventions. The research has for example shown that other policies provided additional opportunities to implement integrated, ecosystem-based flood management (Chapter 3). Implementers used several positive interactions between policy regimes, for example between water regulations and rural development economic instruments, to encourage changes in target populations' behaviour (Chapter 4). Vertically, the research suggests that nested policy regimes, with significant autonomy between governance levels, may help better adapt policies to an adequate scale of intervention. For example, the devolution of legislative powers from the British to the Scottish level increased the involvement of Scottish civil society and political actors in the decision-making process for flood policy, and resulted in greater attention to Scottish specific flood issues (Chapter 2). At a more local level, the research showed that providing greater autonomy to local implementers can enhance their capacity to foster change in target populations (Chapter 4 and 5).

Counter to these positive comments, the Scottish experience also provides evidence for critics of polycentric governance who argue that it may result in more complex decision-making and high transaction costs, thereby reducing adaptability. Horizontally, polycentric governance may create a lack of coherence between policy regimes. For example, water regulations and agricultural economic instruments had conflicting influences on the target population (Chapter 3 and 4). Vertically, polycentric governance may result in poor coherence and heterogeneity in implementation. For example, catchment flood management may be more difficult to achieve where there is little incentive for target populations and implementers to cooperate at the bio-regional level.. National policy makers may not respond to implementers' priorities (Chapter 4); and, alternatively, implementers may not respond to national policy-makers priorities (Chapter 3). The impacts of horizontal and vertical polycentric governance may combine into complex dynamics as separate policy regimes may respond to different issues and demands from policy-makers, implementers and target populations. Differences in policy dynamics may result in maintaining status-quo if social actors rely on other policy regimes or different levels of governance to implement innovative ideas. Successful implementation of integrated, ecosystem-based flood management clearly requires coordinated change at multiple levels of governance, and therefore strong linkages between relevant social actors.

The research supports the assertion in the adaptive governance literature that a strong participatory approach (to foster collaboration between relevant actors) may help overcome the limitations of polycentric governance. The Scottish experience presented multiple forms of participatory governance. Some were formal procedures, for example parliamentary inquiries, statutory multi-stakeholder and multi-agency groups. Others were more informal, for example research and pilot projects involving multiple stakeholders, community meetings, and one-to-one interactions. No significant advantages in using informal over formal participatory mechanisms to foster social learning were observed (in contrast to common prescription in adaptive governance for informal ones). In national policy processes, the research has shown that greater participation through formal mechanisms led to some, although limited, policy learning, and

improved the linking between the policy and political streams (Chapter 2). In local implementation, informal mechanisms improved policy compliance, encouraged uptake of new practices, and led to some communicative learning between implementers and target populations (Chapter 5). However, they also fostered low levels of cognitive and normative learning, and therefore failed to build consensus, at least over the relatively short period during which implementers interacted with the target population.

More than the simplistic formal/informal distinction, the research indicates that the critical factors for successful participatory processes is the institutional context in which it occurs, its inclusive nature, adequate resourcing, time available, and the willingness of participants to reach compromise and learn (Chapters 2 and 5). In particular, attention must be given to non-negotiables (e.g. regulations, business viability), and the level of commitment to the success of the participatory process. Tensions arising from these factors may need to be actively managed to secure fair and representative learning and decision-making in participative processes. For example, policy integration may gain from a structured process framed by guidance, political oversight and statutory duties (e.g. a requirement to coordinate/integrate policies or to participate in management planning) because it may encourage actor interaction and foster innovative ideas when resources are limited and interests directly conflicting (Chapter 3). The research indicates that successful participatory processes between implementers and the target population need strong linkages with other policy instruments influencing the target population and with higher levels of governance (Chapter 5).

The research reported in this thesis suggests a divergence from the common assertion in the adaptive governance literature that policy interventions based on economic incentives and greater networking are necessarily better than regulatory interventions. Regulatory mechanisms may indeed be difficult to enforce and may generate social conflicts on integrated, ecosystem-based flood management. However, they may also provide a powerful leverage to change target populations' behaviour (Chapter 4). The challenge is to create the conditions for engagement and dialogue between implementers and the target population. To do

so, it appears that flexible enforcement to adapt regulations to the local context is important (Chapter 4 and 5). The research supports the idea that economic instruments may be powerful means to secure behaviour change for integrated, ecosystem-based flood management. Nevertheless, the research showed that their design (e.g. level of compensation, duration and the type of costs covered) is critical to foster a response by target populations. In the Scottish experience, existing economic instruments had a highly geographically heterogeneous impact across the landscape (Chapter 4). To be effective for integrated, ecosystem-based flood management, they may need to be associated with direct engagement and negotiation at property level between implementers and target populations. Overall, the Scottish experience indicates that participatory processes are useful complements to other policy instruments in policy implementation.

The research examined the question of leadership. The Scottish experience clearly indicates that individual entrepreneurship is a critical factor to increase the adaptability of governance systems. In particular, leadership around major societal events (e.g. major floods and political events) appears important. Major events worked as catalysts of policy change as well as improved implementation (Chapter 2 and Chapter 5). In these cases, a few individuals led the adoption and implementation of integrated, ecosystem-based flood management. Entrepreneurship arose mostly from organisations capable of sustaining an intense level of activity over long time-scale. At national level, policy actors influential in enhancing policy change were resourceful, and worked over several years (Chapter 2). At the local level, an established catchment organisation independent from the government helped sharing of information between local actors, fostering dialogue, and facilitating negotiation (Chapter 5).

Finally, some lessons can be drawn on experimentation in adaptive governance. The research reported in this thesis identified different means of carrying out experimentation through policy evaluations, pilot projects, assessment methods, guidance documents and the use of planning cycles. The research reported in this thesis suggests there may be a trade-off between the degree of innovation and policy impact. More “research”-oriented experimentations may encourage more

innovation than more “management” oriented ones because they are less constrained by policy timescales and targets, but they may also be less likely to influence decision-making (Chapter 2 and 3). When examining in more detail a local project (Chapter 5), it appears that the capacity of experiments to foster innovation is limited by the same factors that constrain social learning. The research has also observed that experimentations may also be used as advocacy instruments rather than fostering a culture of testing, monitoring and learning (Chapter 2 and 3).

Overall, the research in this thesis shows that the analysis of the public policy process, and the activities of government, is a powerful approach to understanding adaptive governance, and the ways in which society can improve its capacity to deal with social and environmental crisis and change. In this research, the government appeared to have an important, if not critical, role in encouraging and framing collaborative action between social actors. This goes some way against the dominant trend in academic literature focusing on governance, rather than government.

6.3. RESEARCH LIMITATIONS AND FURTHER RESEARCH

This research has necessarily focused on specific themes and methods to investigate adaptive water governance. This section presents briefly the limitations of the thesis, and suggests developments in need of further consideration.

The research reported in this thesis is based on a strong inductive process, focusing on those empirical elements that arise most strongly in the case-study selected. This led to more attention given to specific concepts (e.g. polycentric governance, public participation, social learning, etc), and less attention to others such as experimentation and leadership. Using a more deductive approach could have helped unravel these dimensions further and their linkages with more

explored concepts. Using a more deductive approach could also have led to more “testing”, that is the systematic comparison of opposing theories with observations.

A number of theoretical developments and several conclusions supported by strong empirical evidence, were nevertheless achieved. In particular, future work could use the conceptual lens developed in this thesis to further understanding of the policy process for adaptive governance, both in the context of flood management, or in new contexts (e.g. other environmental, economic or social issues). Staying in the context of flood management, future research could for example include urban development and emergency planning for a broader view of flood (risk) management. Future work could also examine policy interactions through new integrative concepts now being developed in policy such as ecosystem services. Finally, policy recommendations stated in the next section could also be used as hypotheses for further research in other contexts or using comparative studies and larger samples.

Research is necessarily limited by the analytical lens chosen to explore the phenomena under study. In this thesis, the interest in matters of a political nature in adaptive governance led to using concepts from the policy sciences. Methodologically, an attempt had been made to maintain a balance between the politics of the policy process, and its sociological dimension (e.g. learning). However, other approaches could offer other insights. For example, the influence of physical, social and political events, or of different policy appraisal methods in the policy process, could be explored using constructivist approaches, in particular work on the sociology of risk.

Furthermore, concepts used in the thesis such as policy integration and implementation helped focus the analysis on the action of public organisations in the public sphere. However, findings suggest that dynamics internal to organisations (e.g. public agencies) significantly influence their behaviour, within the administration and between the administration and politicians. Further insights into the factors influencing adaptive water governance could be gained using

work in public administration and new public management in order to examine more closely intra-organisational dynamics, or the relationship between politics and administration.

This research found leadership to be a critical component of adaptive governance. The policy sciences literature provided useful concepts to theorise the interaction between leadership and its institutional context. However, other characteristics may be important e.g. individual qualities such as charisma and experience. Research on these may need to draw on other theoretical concepts, perhaps on the literature on political leadership. Using other methods (e.g. life histories) might yield new insights. Leadership of non-governmental catchment organisations (e.g. the Tweed Forum) was found to be important to implement integrated, ecosystem-based flood management. Further research could examine more closely the leadership qualities required by such organisations.

This research focused on the effectiveness of governance systems, in particular with regards to social actor behaviour. The research also considered how effective they were in targeting these activities adequately in the local environment. However further research could expand on other assessment criteria of governance systems, for example their effectiveness in environmental outcomes, their efficiency, or their accountability. Such approach would need the input of disciplines such as hydrology, economics, and political sciences.

Future work could examine the implications for adaptive governance of different types of international networks. This research focused on the dynamics internal to Scotland, but the involvement of external experts (e.g. UK Government) was observed. The influence on Scotland of other bureaucracies and international epistemic communities could be explored, as well as different ways to foster policy learning through such mechanism. The policy sciences again provide a valuable methodological lens to examine such interaction.

Finally, future work on the themes and issues examined in this research could be carried out using different methods. This research used documentary analysis,

interviews and Q Methodology which are suited for small samples. Further work could test the outcomes of this research on a larger sample of social actors (e.g. land managers) and contexts (e.g. countries, restoration projects), for example through surveys and statistical techniques. Rather than using personal accounts, further research could be built on more indirect methods, for example cognitive tests to evaluate learning or ethnographic studies. Future research could also examine changes in learning and participation over a longer period, using pre and post evaluations.

6.4. POLICY RECOMMENDATIONS

Keeping in mind the limitations of the research, this section makes recommendations on how to foster and maintain an adaptive approach to integrated, ecosystem-based flood management based on the outcomes of the research. The aim is to support the continuous emergence, selection and implementation of new ideas, concepts, policies and practices where disagreements and differences are treated in an effective, fair and deliberative way. Eight key recommendations are made. These could also be considered as hypotheses to be further tested.

- 1. Opportunities for policy change should be maintained through strong stakeholder involvement and political oversight*

Policy review should not occur in a political vacuum in the corridors of the government and public agencies. The process should be structured through an open, inclusive public debate between stakeholders, and include political actors. At the national level, the Scottish Advisory and Implementation Forum for Flooding is a good initiative for engaging government, agencies and stakeholders. The annual overview of flood policy implementation by the Scottish Parliament should also be seen as an important opportunity to foster additional political debate and bring legitimacy to fundamental changes in policy objectives. At the local level, the set up of stakeholder groups for flood management is a good step

towards inclusive and deliberative decision-making. However, more opportunities for political participation should be ensured.

2. A common language and methodologies between policy regimes can build momentum towards policy integration

In some cases, policy integration may not need a new policy regime. Overarching strategies and roadmaps may guide future revisions of sectoral policies. New concepts can bring together policies, and their representation of societal problems. Ideas such as multiple benefits and ecosystem services for example may have a role in conceptualising the rural environment as producing simultaneously food and flood alleviation benefits. The Scottish Land Use Strategy is a good example of an overarching guiding strategy. Alternatively, common guidance and assessment criteria could help streamline decision-making. In Scotland, policy instruments require further modifications in order to fully consider integrated, ecosystem-based flood management in their design. Further collaboration between different public organisations and stakeholders would likely be needed in that regard.

3. Multi-actor advisory groups can improve policy integration, but stronger common governance arrangements may also be required

Advisory groups for management planning (e.g. national and local Flood Risk Advisory Groups) are effective means to engage actors, and help find synergies between policies. They may not only be set up for management planning, but also for the implementation of policy instruments. In Scotland, multi-agency groups exist for such purpose, such as the Scotland's Environmental and Rural Services (where any agency can be contacted for any regulations and may be responsible for enforcing any regulations). However, advisory groups are not necessarily sufficient to effectuate successful policy integration. Involved actors and organisations need to be committed to policy integration. Integration itself may need to become a policy or statutory objective. The duty for greater co-ordination

between public agencies in the Flood Risk Management (Scotland) Act 2009 is one step in that direction.

4. Local implementers should have more power on the enforcement of policies

Land management change should be seen as a deliberative process where compromises and learning are central. Local implementers should have enough power over the enforcement of regulations and the use of economic instruments to adapt implementation to the local context (while retaining national consistency). The establishment of the multi-stakeholder Regional Proposal Assessment Committees for the Scottish Rural Development Programme is a good attempt at fostering collaboration between local implementers. However, more resources and more flexible guidelines should allow local implementers to find adequate synergies between each other and with each individual land manager. In this sense, national guidance, assessment criteria, and performance indicators could become broader and allow local adaptation.

5. Policy instrument mixes across policies can be an effective mean to influence land managers

Policy instruments influencing land managers exist in multiple policies. In Scotland, some conflicting interactions were observed, for example between water regulations and agricultural economic incentives. However, policy implementation can also built on the diversity of mechanisms available, and improve their interactions.

6. Regulatory tools should be accompanied by strong engagement with the target population

Regulatory tools are often discredited for their inefficiency and their potential to exacerbate opposition from target populations. However, they can be powerful

means to engage with society and fundamentally change behaviour. To do so, they need to be underpinned by strong engagement (and adequate resourcing of it).

- 7. Economic instruments are essential means for redistributing costs and benefits in a catchment; however their effectiveness is highly dependent on the target population's interests, values and beliefs*

Economic instruments can exploit, in an effective way, land managers' concerns about short and long-term financial and non-financial returns, who will benefit and who will bear responsibility. However, if they do not take into account the local context and characteristics of the target population, they may also be highly ineffective. In Scotland, integrated, ecosystem-based flood management can build on land managers' desire to diversify their income stream and improve their properties. Currently, the Scottish Rural Development Programme relies to a large extent on the pro-active behaviour of individual land managers. To be more effective and target adequate areas across the catchment, it should encourage collective applications and the greater involvement of hydrological experts in the targeting of incentives.

- 8. Non-governmental catchment organisations can be an effective way to foster local collaboration and improve policy implementation*

Non-governmental organisations appear to be an effective way to mediate between conflicting actors ("honest broker") because they do not necessarily respond to statutory and policy targets. Voluntary, catchment organisations can also help drive forward implementation of integrated, ecosystem-based flood management, especially where the existing institutional framework is ineffective. They can help identify opportunities for rural changes in land management with more willing land managers, and help overcome opposition through negotiation.

References

- Adams, W. M., Perrow, M. R., & Carpenter, A. (2005). Perceptions of river managers of institutional constraints on floodplain restoration in the UK. *Journal of Planning and Management*, 48(6), 877-889.
- Adger, W. E. (2006). Vulnerability. *Global Environmental Change*, 16, 268-281.
- Alphen, J. V., & Lodder, Q. (2006). Integrated Flood Management: experiences of 13 countries with their implementation and day-to-day management. *Irrigation and Drainage*, 55, 159-171.
- Armitage, D., Marschke, M., & Plummer, R. (2008). Adaptive co-management and the paradox of learning. *Global Environmental Change*, 18, 86-98.
- Arnstein, S. (1969). A ladder of citizen participation. *Journal of the American Planning Association*, 35(4), 216-224.
- Aylward, B., Bandyopadhyay, J., Belausteguigotia, J. C., & Co-Authors (2005). Freshwater Ecosystem Services. In R. Hassan, R., Scholes, & N. Nash (Eds.), *Ecosystems and Human Well-being: Current State and Trends, Volume 1* (pp. 213-255). London, England: Island Press.
- Babbie, E. (2008). *The Basics of Social Research* (4th ed.). Belmont, CA: Thomson Wadsworth.
- Barrett, S. M. (2004). Implementation studies: time for a revival? Personal reflections on 20 years of implementation studies. *Public Administration*, 82(2), 249-262.
- Bazeley, P. (2007). *Qualitative Data Analysis with NVIVO*. London, England: SAGES.
- Beaufoy, G., Jones, G., Kazakova, Y., McGurn, P., Poux, X., & Stefanova, V. (2011). *Permanent Pastures and Meadows under the CAP: the Situation in 6 Countries*. Durham, England: European Forum on Nature Conservation and Pastoralism.
- Béland, D. (2010). Ideas, institutions and policy change. *Journal of European Public Policy*, 16(5), 701-718.
- Benn, S., Dunphy, D., & Martin, A. (2009). Governance of environmental risk: new approaches to managing stakeholder involvement. *Journal of Environmental Management*, 90, 1567-1575.
- Bennett, C. J., & Howlett, M. (1992). The lessons of learning: reconciling theories of policy learning and policy change. *Policy Sciences*, 25, 275-294.
- Berkes, F., & Folke, C. (Eds.). (1998). *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience*. Cambridge, England: Cambridge University Press.
- Birkland, A. (2006). *Lessons of Disaster: Policy Change after Catastrophic Events*. Washington, DC: Georgetown University Press.
- Biswas, A. K. (2004). Integrated water resources management: a reassessment. *Water International*, 29(2), 248-256.

- Blackstock, K. L., & Richards, C. (2007). Evaluating stakeholder participation in river basin planning: a Scottish case-study. *Water Policy*, 9, 493-512.
- Blackstock, K. L., Ingram, J., Burton, R., Brown, K. M., & Slee, B. (2009). Understanding and influencing behaviour change to improve water quality. *Science of the Total Environment*, 408, 5631-5638.
- Blomquist, W., & Shlager, E. (2005). Political pitfalls of integrated watershed management. *Society and Natural Resources: an International Journal*, 18(2), 101-117.
- Booher, D. E., & Innes, J. E. (2010). Governance for resilience: CALFED as a complex adaptive network for resource management. *Ecology and Society*, 15(3): 35.
- Borowski, I., Le Bourhis, J. P., Pahl-Wostl, C., & Barraque, B. (2008). Spatial misfit in participatory river basin management: effects on social learning, a comparative analysis of German and French case-studies. *Ecology and Society*, 13(1):7.
- Bressers, H., & Kuks, S. (Eds.) (2004). *Integrated Governance and Water Basin Management. Conditions for Regime Change and Sustainability*. Dordrecht, Netherlands: Kluwer Academic Publishers.
- Briassoulis, H. (2004). *Policy integration for complex policy problems*. Paper presented at the Human Dimensions of Global Environmental Change Conference Greening of Policies: Interlinkages and Policy Integration, 3-4 December 2004, Berlin, Germany.
- Brody, S. D., Zahran, S., Highfield, W. E., Bernhardt, S. P., & Vedlitz, A. (2009). Policy learning for flood mitigation: a longitudinal assessment of the community rating system in Florida. *Risk Analysis*, 29(6), 912-929.
- Brooks, N. (2003). *Vulnerability, risk and adaptation: a conceptual framework*. Tyndall Centre for Climate Change Research, Working Paper 38.
- Brown, S. R. (1980). *Political Subjectivity: Applications of Q-methodology in Political Science*. London, England: Yale University Press.
- Bull, R., Petts, J., & Evans, J. (2008). Social learning from public engagement: dreaming the impossible? *Journal of Environmental Planning and Management*, 51(5), 701-716.
- Burgess, J., Clark, J., & Harrison, C. M. (2000). Knowledges in action: an actor network analysis of a wetland agri-environment scheme. *Ecological Economics*, 35, 119-132.
- Burnham, P., Lutz, K. G., Grant, W., & Layton-Henry, Z. (2008). *Research Methods in Politics*. Basingstoke, England: Palgrave Macmillan.
- Burton, A. J. R., Shepard, M. A., & Riddell, K. J. (2003). Land use and flood risk through catchment flood management plans. *The Journal*, V17N4, 220-225
- Burton, I., Kates, R. W., & White, G. F. (1993). *The Environment as Hazard*. London, England: The Guilford Press.
- Burton, R. J. F. (2004). Reconceptualising the “behavioural approach” in agricultural studies: a socio-psychological perspective. *Journal of Rural Studies*, 20, 359-371.

- Cairney, P., Keating, M., & Hepburn, E. (2009). *Policy convergence, transfer and learning in the UK under devolution*. Paper presented at the Political Studies Association Conference Challenges for Democracy in a Global Era, 7-9 April 2009, Manchester, England.
- Carroll, Z. L., Bird, S. B., Emmett, B. A., Reynolds, B., & Sinclair, F. L. (2004). Can tree shelter on agricultural land reduce flood risk? *Soil Use and Management*, 20, 357-359.
- Civil Contingency Act 2004 (c.36). An Act of the Parliament of the United Kingdom, 18th November 2004.
- Collins, K., & Ison, R. (2009). Jumping off Arnsein's ladder: social learning as a new policy paradigm for climate change adaptation. *Environmental Policy and Governance*, 19, 358-373.
- Considine, M. (2004). Policy interventions and citizen engagement. In M. Considine (Ed.), *Making Public Policy: Institutions, Actors and Strategies* (pp. 186-206). Cambridge, England: Polity.
- Controlled Activities Regulations (CAR). Water Environment (Controlled Activities) (Scotland) Regulations 2005. Scottish Statutory Instrument 2005 No 348, Environment Protection Water, 7th June 2005.
- Cook, B. R. (2010). Flood knowledge and management in Bangladesh: increasing diversity, complexity and uncertainty. *Geography Compass*, 4(7), 750-767.
- Cook, P. (2009). *Scotland Rural Development Programme: First Stage Review*. Scotland: Cook & Partners.
- CoSLA (Convention of Scottish Local Authorities) (2003). *Flood Task Group Final Report*. Edinburgh, Scotland: Convention of Scottish Local Authorities.
- CoSLA (Convention of Scottish Local Authorities) (2008). Written evidence. In Rural Affairs and Environment Committee, *Flooding and Flood Management*, 2nd Report (Session 3), SP Paper 96. Edinburgh, Scotland: The Scottish Parliament.
- Council Directive (79/409/EEC) on the Conservation of Wild Birds. *Official Journal of the European Communities*, L103, 1-18.
- Council Directive (92/43/EEC) on the Conservation of Natural Habitats and of Wild Fauna and Flora. *Official Journal of the European Communities*, L206, 7-50.
- DEFRA (Department for Environment, Food and Rural Affairs) (2005). *Making Space for Water: Taking forward a new government strategy for flood and coastal erosion risk management in England*. London, England: Department for Environment, Food and Rural Affairs.
- DEFRA (Department for Environment, Food and Rural Affairs) (2007a). *Conserving Biodiversity: the UK Approach*. London, England: Department for Environment, Food and Rural Affairs.
- DEFRA (Department for Environment, Food and Rural Affairs) (2007b). *The Rural Development Programme for England 2007-2013*. London: Department for Environment, Food and Rural Affairs.

- Delli Priscoli, J. (2009). Appendix 2.1: Evolution of public involvement in water planning. In C. S. Russell, & D. D. Baumann (Eds.), *The Evolution of Water Resource Planning and Decision Making* (pp. 62-79). Cheltenham, England: Edward Elgar Publishing.
- Diduck, A. (2010). The Learning Dimension of Adaptive Capacity. In D. Armitage, & R. Plummer (Eds.), *Adaptive Capacity and Environmental Governance* (pp. 199-221). London, England: Springer.
- Dietz, T., Ostrom, E., & Stern, P.C. (2003). The struggle to govern the commons. *Science*, 302, 1907-1912.
- Directive (2000/60/EC) of the European Parliament and the Council Establishing a Framework for Community Action in the Field of Water Policy. *Official Journal of the European Communities*, L327, 1-72.
- Directive (2007/60/EC) of the European Parliament and of the Council on the Assessment and Management of Flood Risks. *Official Journal of the European Communities*, L288, 27-34.
- Dovers, S. R., & Hezri, A. A. (2010). Institutions and the policy process. *WIREs Climate Change*, 1, 212-231.
- Dryzek, J. S., & Berejikian, J. (1993). Reconstructive democratic theory. *American Political Science Review*, 87(1), 48-60.
- Duit, A. & Galaz, V. (2008). Governance and Complexity: emerging issues for governance theory. *Governance: An International Journal of Policy, Administration, and Institutions*, 21(3), 311-335.
- Duit, A., Galaz, V., & Ebbesson, J. (2010). Governance, complexity, and resilience. *Global Environmental Change*, 20, 363-368.
- Dwyer, J., Mills, J., Ingram, J., Taylor, J., Burton, R., Blackstock, K., Slee, B., Brown, K., Schwarz, G., Matthew, K., & Dilley, R. (2007). *Understanding and Influencing Behaviour Change in Farmers and Land Managers*. London, England: Department for Environment, Food and Rural Affairs.
- EA (Environment Agency) (1998). *Response to the Independent Report on the Easter 1998 Floods: Action Plan, November 1998*. Bristol, England: Environment Agency.
- EA (Environment Agency) (2001). *Lessons Learned: the Autumn 2000 Floods*. Bristol, England: Environmental Agency.
- EA (Environment Agency) (2004). *Catchment Flood Management Plans Volume 1 Policy Guidance*. Bristol, England: Environment Agency.
- EA (Environment Agency) (2009). *Till and Breamish Catchment Flood Management Plan, Summary Report*. Leeds, England: Environment Agency.
- EEA (European Environment Agency) (2010). *Mapping the Impacts of Natural Hazards and Technological Accidents in Europe: an Overview of the Last Decade*. EEA Technical Report No 13/2010. Copenhagen, Denmark: European Environment Agency.
- Eden, S., Donaldson, A., & Walker, G. (2005). Structuring subjectivities? Using Q methodology in human geography. *Area*, 37(4), 413-422.

- Environment Act 1995 (c25). An Act of the Parliament of the United Kingdom, 19th July 1995.
- European Commission (2009). White Paper on Adapting to Climate Change: Towards a European Framework for Action (COM 147/4). April 2009.
- Everard, M., Bramley, M., Watts, B., Tatem, K., & Appleby, T. (2009). Flood Management: from defence to sustainability. *Environmental Liability*, 2, 35-49.
- Fabricius, C., Folke, C., Cundill, C., & Schultz, L. (2007). Powerless spectators, coping actors, and adaptive co-managers: a synthesis of the role of communities in ecosystem management. *Ecology and Society*, 12(1): 29.
- FC (Forestry Commission) (2007). *Tree Felling: Getting Permission*. Edinburgh, Scotland: Forestry Commission.
- FC (Forestry Commission) (2009a). *Dumfries and Borders Forest District Strategic Plan 2009-2013*. Edinburgh, Scotland: Forestry Commission.
- FC (Forestry Commission) (2009b). *Undertaking an Environmental Impact Assessment in Forestry and Preparing an Environmental Statement*. Edinburgh, Scotland: Forestry Commission.
- FC (Forestry Commission) (2010). *The Scottish Forestry Strategy Implementation Plan 2010-2013 and 2009-2010 Progress Report*. Edinburgh, Scotland: Forestry Commission.
- FC (Forestry Commission) (2011a). *The UK Forestry Standard: the Government's Approach to Sustainable Forestry*. Edinburgh, Scotland: Forestry Commission.
- FC (Forestry Commission) (2011b). *Forest and Biodiversity: UK Forestry Standard Guidelines*. Edinburgh, Scotland: Forestry Commission.
- FC (Forestry Commission) (2011c). *Forest and Climate Change: UK Forestry Standard Guidelines*. Edinburgh, Scotland: Forestry Commission.
- FC (Forestry Commission) (2011d). *Forest and Soils: UK Forestry Standard Guidelines*. Edinburgh, Scotland: Forestry Commission.
- FC (Forestry Commission) (2011e). *Forest and Water: UK Forestry Standard Guidelines*. Edinburgh, Scotland: Forestry Commission.
- Ferreira, C., de Loe, R. C., & Kreutzweiser, R. D. (2008). Imagined communities, contested watersheds: challenges to integrated water resources management in agricultural areas. *Journal of Rural Studies* 24, 304-321.
- FIAC (Flooding Issues Advisory Committee) (2006). *Sustainable Flood Management and Rural Land Use*. Edinburgh, Scotland: Flooding Issues and Advisory Committee.
- FIAC (Flooding Issues Advisory Committee) (2007). *Final Report*. Edinburgh, Scotland: Flooding Issues and Advisory Committee.
- Fish, R. D., Ioris, A. A. R., & Watson, N. M. (2009). Integrating water and agricultural management: collaborative governance for a complex policy problem. *Science of the Total Environment*, 408(23), 5623-5630.
- Fisher, F., & Forester, J. (1993). Introduction. In F. Fisher, & J. Forester (Eds.), *The Argumentative Turn in Policy Analysis and Planning* (pp. 1-20). Durham, England: Duke University Press.

- Fisher, J., & Brown, K. (2009). Wind energy on the Isle of Lewis: implications for deliberative planning. *Environment and Planning A*, 41, 2516-2536.
- Flood and Water Management Act 2010 (c29). An Act of the Parliament of the United Kingdom, 8th April 2010.
- Flood Prevention (Scotland) Act 1961. An Act of the Parliament of the United Kingdom, 2nd February 1961.
- Flood Prevention and Land Drainage (Scotland) Act 1997. An Act of the Scottish Parliament, 21st March 1997.
- Flood Risk Management (Scotland) Act 2009. An Act of the Scottish Parliament, 14th May 2009.
- Flyvberg, B. (2006). Five misunderstanding about case-study research. *Qualitative Inquiry*, 12(2), 219-245.
- Focht, W. (2002). Assessment and management of policy conflict in the Illinois river watershed in Oklahoma: an application of Q Methodology. *International Journal of Public Administration*, 25(11), 1311-1349.
- Foddy, W. (1993). *Constructing Questions for Interviews and Questionnaires: Theory and Practice in Social Research*. Cambridge, England: Cambridge University Press.
- Folke, C., Hahn, T., Olsson, P., & Norberg, J. (2005). Adaptive governance of social-ecological systems. *Annual Review of Environment and Resources*, 30, 441-473.
- Frantzi, S., Carter, N. T., & Lovett, J. C. (2009). Exploring discourses on international environmental regime effectiveness with Q Methodology: a case study of the Mediterranean Action Plan. *Journal of Environmental Management*, 90, 177-186.
- Galaz, V. (2007). Water governance, resilience and global environmental change – a reassessment of integrated water resources management. *Water Science & Technology*, 56(4), 1-9.
- Gallopín, G. C. (2006). Linkages between vulnerability, resilience, and adaptive capacity. *Global Environmental Change*, 16, 293-303.
- Garforth, C., & Rehman, T. (2006). *Research to Understand and Model the Behaviour and Motivations of Farmers in Responding to Policy Changes*. Project Report n9. Reading, England: University of Reading.
- George, A. L., & Bennett, A. (2005). *Case-Studies and Theory Development in the Social Sciences*. Cambridge, MA: MIT Press.
- Gilvear, D., & Casas, R. (2008). *River Restoration at the Catchment Scale in Scotland: Current Status and Opportunities*. Stirling, Scotland: Centre for River EcoSystem Science.
- Gilvear, D. J., Casas-Mulet, R., & Spray, C. J. (2010). Trends and issues in delivery of integrated catchment-scale river restoration: lessons learned from a national river restoration survey within Scotland. *River Research and Applications*, 28(2), 234-246.
- Gonzales, J. (2006). *Institutional Analysis of Flood Management in Scotland*. MSc thesis. Edinburgh, Scotland: University of Edinburgh.
- Grabs, W., Tyagi, A. C., & Hyoto, M. (2007). Integrated flood management. *Water Science and Technology*, 56(4), 97-103.

- Griffin, C. B. (1999). Watershed councils: an emerging form of public participation in natural resource management. *Journal of the American Water Resources Association*, 35(3), 505-518.
- Gunderson, L. H., & Holling, C.S. (Eds.) (2002). *Panarchy: Understanding Transformations in Human and Natural Systems*. Washington, DC: Island Press.
- Gunningham, N., & Sinclair, D. (1998). Chapter 6: Designing Environmental Policy. In N. Gunningham, P.N. Grabosky, & D. Sinclair (Eds.), *Smart Regulation: Designing Environmental Policy* (pp. 376-454). Oxford, England: Clarendon Press.
- GWP (Global Water Partnership) (2000). *Integrated Water Resources Management*. TAC Background Papers No 4. Stockholm, Sweden: Global Water Partnership.
- GWP (Global Water Partnership) (2009). *Triggering Change in Water Policies*. Policy Brief 8. Stockholm, Sweden: Global Water Partnership.
- Hajer, M. A., & Wagenaar, H. (Eds.) (2003). *Deliberative Policy Analysis: Understanding Governance in the Network Society*. Cambridge, England: Cambridge University Press.
- Hall, P. A. (1993). Policy paradigms, social learning, and the state: the case of economic policymaking in Britain. *Comparative Politics*, 25(3), 275-296.
- Hansard (1960). House of Commons, Scottish Standing Committee, 15th December 1960, volume 4.
- Hansard (1997). House of Commons, 26th February 1997, volume 5.
- Hatfield-Dodds, S., Nelson, R., & Cook, D. C. (2007). *Adaptive governance: an introduction, and implications for public policy*. Paper presented at the Australian and New-Zealand Society for Ecological Economics Conference, 5-7th July 2007, Noosa, Australia.
- Hay, C. (2002). *Political analysis*. Basingstoke, England: Palgrave Macmillan.
- HC (House of Commons) (1950). Report of the Land Drainage (Scotland) Committee for the Scottish Office Department of Agriculture for Scotland. House of Common Parliamentary Papers.
- Hill, M., & Hupe, P. (Eds) (2009). *Implementing Public Policy: an Introduction to the Study of Operational Governance* (2nd ed.). London, England: SAGE.
- Holling, C. S. (1973). Resilience and stability of ecological systems. *Annual Review of Ecological Systems*, 4, 1-21.
- Holling, C. S. (1978). *Adaptive Environmental Assessment and Management*. London, UK: John Wiley.
- Hooper, B. P. (2003). Integrated water resources management and river basin governance. *Water Resources Update*, 126, 12-30.
- Howgate, O. R., & Kenyon, W. (2009). Community cooperation with natural flood management: a case-study in the Scottish Borders. *Area*, 41(3), 329-340.

- Howlett, M. (2004). Beyond good and evil in policy implementation: instrument mixes, implementation styles, and second generation theories of policy instrument choice. *Policy and Society*, 23(2), 1–17.
- Howlett, M. (2009). Governance modes, policy regimes and operational plans: a multi-level nest model of policy instrument choice and policy design. *Policy Science*, 42, 73-89.
- Hudson, J., & Lowe, S. (2004). *Understanding the Policy Process: Analysing Welfare Policy and Practice*. Bristol, England: The Policy Press.
- Huitema, D., & Meijerink, S. (2010). Realising water transitions: the role of policy entrepreneurs in water policy change. *Ecology and Society*, 15(2): 26.
- Huitema, D., Cornelisse, C., & Ottow, B. (2010). Is the jury still out? Toward greater insight in policy learning in participatory decision processes –the case of Dutch citizens juries on water management in the Rhine Basin. *Ecology and Society*, 15(1): 16.
- Huitema, D., Mostert, E., Egas, W., Moellenkamp, S., Pahl-Wostl, C., & Yalcin, R. (2009). Adaptive water governance: assessing the institutional prescriptions of adaptive (co)management from a governance perspective and defining a research agenda. *Ecology and Society*, 14(1): 26.
- Huntjens, P., Pahl-Wostl, C., Rihoux, B., Schluter, M., Flachner, Z., Neto, S., Koskova, R., Fickens, C., & Nabide Kiti, I. (2011). Adaptive water management and policy learning in a changing climate: a formal comparative analysis of eight water management regimes in Europe, Africa, and Asia. *Environmental Policy and Governance*, 21, 145-163.
- ICE (2001). *Learning to Live with Rivers*. London, England: Institution of Civil Engineers.
- Imperial, M. T. (2005). Using collaboration as a governance strategy: lessons from six watershed management programs. *Administration & Society*, 37(3), 281-320.
- Ingram, J. (2008). Agronomist–farmer knowledge encounters: an analysis of knowledge exchange in the context of best management practices in England. *Agriculture and Human Values*, 25, 405-418.
- Ioris, A. A. R. (2008). Water institutional reforms in Scotland: contested objectives and hidden disputes. *Water Alternatives*, 1(2), 253-270.
- Ison, R., & Watson, D. (2007). Illuminating the possibilities for social learning in the management of Scotland’s water. *Ecology and Society*, 12(1): 21.
- Ison, R., Roling, N., & Watson, D. (2007). Challenges to science and society in the sustainable management and use of water: investigating the role of social learning. *Environmental Science and Policy*, 10, 499-511.
- Ison, R., Collins, K., Colvin, J., Jiggins, J., Roggero, P. P., Seddaiu, G., Steyaert, P., Toderi, M., & Zanolli, C. (2011). Sustainable catchment managing in a changing world: new integrative modalities for connecting policy makers, scientists and other stakeholders. *Water Resources Management*, 25, 3977-3992.

- JBA (2005). *Natural Flood Storage and Extreme Flood Events*. Edinburgh, Scotland: Scottish Executive.
- JBA (2007). *Scottish Flood Defence Asset Database: Final Report*. Edinburgh, Scotland: Scottish Executive.
- John, P. (1998). *Analysing Public Policy*. London, England: Continuum.
- Johnson, C. L., Penning-Rowsell, E. C., & Parker, D. (2007). Natural and imposed injustices: the challenges in implementing fair flood risk management policy in England. *The Geographical Journal*, 173(4), 374-390.
- Johnson, C. L., Tunstall, S. M., & Penning-Rowsell, E. C. (2005). Floods as catalysts for policy change: historical lessons from England and Wales. *Water Resources Development*, 21(4), 561-575.
- Jordan, A. (2008). The governance of sustainable development: taking stock and looking forwards. *Environment and Planning C: Government and Policy*, 26, 17-33.
- Jordan, A., & Lenschow, A. (2010). Environmental policy integration: a state of the art review. *Environmental Policy and Governance*, 20, 147-158.
- Kallis, G., Kiparsky, M., & Norgaard, R. (2009). Collaborative governance and adaptive management: lessons from California's CALFED water program. *Environmental Science & Policy*, 12, 631-643.
- Kennedy, K., Simonovic, S., Tejada-Guibert, A., de Franca Doria, M., & Martin, J. L. (2009). *IWRM Implementation in Basins, Sub-basins and Aquifers : State of the Art Review*. World Water Assessment Programme, Insights. Paris, France: UNESCO.
- Kenyon, W. (2007). Evaluating flood risk management options in Scotland: a participant-led multi-criteria approach. *Ecological Economics*, 64, 70-81.
- Kenyon, W., Hill, G., & Shannon, P. (2008). Scoping the role of agriculture in sustainable flood management. *Land use Policy*, 25, 351-360.
- Kingdon, J. W. (2003). *Agendas, Alternatives and Public Policies (2nd ed.)*. New York, NYC: Longman.
- Kissland-Naf, I., & Kuks, S. (2004). *The Evolution of National Water Regimes in Europe: Transitions in Water Rights and Water Policies*. Dordrecht, The Netherlands: Kluwer Academic Publishers.
- Klein, R. J. T., Nicholls, R. J., & Thomalla, F. (2003). Resilience to natural hazards: how useful is this concept? *Environmental Hazards*, 5, 35-45.
- Knowler, D., & Bradshaw, B. (2007). Farmers' adoption of conservation agriculture: a review and synthesis of recent research. *Food Policy*, 32, 25-48.
- Kooiman, J. (1993). Social-political governance: introduction. In J. Kooiman (Ed.), *Modern Governance: New Government-Society Interactions* (pp. 1-7). London, England: SAGES.
- Kron, W. (2002). Flood risk = hazard x exposure x vulnerability. In B. Wu, Z.Y. Wang, G. Wang, G. G. H. Huang, H. Fang, & J. Huang (Eds), *Flood Defence*. New York, NYC: Science Press.

- Krysanova, V., Buiteveld, H., Haase, D., Hattermann, F. F., van Niekerk, K., Roest, K., Martinez-Santos, P., & Schluter, M. (2008). Practices and lessons learned in coping with climatic hazards at the river basin scale: floods and droughts. *Ecology and Society*, 12(2): 32.
- Land Drainage (Scotland) Act 1958. An Act of the Parliament of the United Kingdom, 14th May 1958.
- Leach, W. D., & Pelkey, N. W. (2001). Making watershed partnerships work: a review of the empirical literature. *Journal of Water Resources Planning and Management*, 127(6), 378-385.
- Leach, W. D., & Sabatier, P. A. (2005). To trust an adversary: integrating rational and psychological models of collaborative policymaking. *American Political Science Review*, 99(4), 491-503.
- Lebel, L., Grothmann, T., & Siebenhuner, B. (2010). The role of social learning in adaptiveness: insights from water management. *International Environmental Agreements*, 10, 333-353.
- Lebel, L., Manuta, J. B., & Garden, P. (2011). Institutional traps and vulnerability to changes in climate and flood regimes in Thailand. *Regional Environmental Change*, 11(1), 45-58.
- Lee, K.N. (1999). Appraising adaptive management. *Ecology and Society*. 3(2):3.
- Lenschow, A. (Ed.) (2002). *Environmental Policy Integration: Greening Sectoral Policies in Europe*. London, England: Earthscan.
- Linch, P. (2001). *Scottish Government and Politics: an Introduction*. Edinburgh, Scotland: Edinburgh University Press.
- Loucks, D.P. (2000). Sustainable water resources management. *Water International*, 25(1), 3-10.
- Lubell, M. (2004). Collaborative environmental institutions: all talk and no action? *Journal of Policy Analysis and Management*, 23(3), 549-573.
- Lubell, M., Schneider, M., Scholz, J. T., & Mete, M. (2002). Watershed partnerships and the emergence of collective action institutions. *American Journal of Political Science*, 46(1), 148-163.
- Lundqvist, L. J. (2004). Integrating Swedish Water Resource Management: a multi-level governance trilemma. *Local environment*, 9(5), 414-424.
- Mahoney, J. & Thelen, K. (Eds.) (2010). *Explaining Institutional Change: Ambiguity, Agency and Power*. Cambridge, MA: Cambridge University Press.
- Mainstone, C. P., & Holmes, N. T. H. (2010). Embedding a strategic approach to river restoration in operational management processes: experiences in England. *Aquatic Conservation: Marine and Freshwater Ecosystems*, 20, 82-95.
- Marsden, K. (2011). *SPICe Briefing: CAP Reform - Legislative proposals*. Edinburgh, Scotland: Scottish Parliament.
- McKissock, G., D'Arcy, B., Wild, T., Usman, F., & Wright, P. (2003). An evaluation of SUDS guidance in Scotland. In M. Bruen (Ed.), *Diffuse Pollution and Basin Management*. Proceedings of the 7th International Specialised International Water Association Conference, Dublin, Ireland.

- Medema, W., McIntosh, B. S., & Jeffrey, P. J. (2008). From premise to practice: a critical assessment of integrated water resources management and adaptive management approaches in the water sector. *Ecology and Society*, 13(2): 29.
- Meijerink, S. (2005). Understanding policy stability and change: the interplay of advocacy coalitions and epistemic communities, windows of opportunity, and Dutch coastal flooding policy 1945-2003. *Journal of European Public Policy*, 12(6), 1060-1077.
- Meijerink, M., & Huitema, D. (2010). Policy entrepreneurs and change strategies: lessons from sixteen case studies of water transitions around the globe. *Ecology and Society*, 15(2): 21.
- Merz, B., Hall, J., Disse, M., & Schumann, A. (2010). Fluvial flood risk management in a changing world. *Natural Hazards and Earth System Sciences*, 10(3), 509-527.
- Mitchell, B. (2005). Integrated water resource management, institutional arrangements, and land-use planning. *Environment and Planning A*, 37, 1335-1352.
- Mitchell, B., & Hollick, M. (1993). Integrated catchment management in Western Australia: transition from concept to implementation. *Environmental Management*, 17(6), 735-743.
- MNV, & Tweed Forum (2010). *Bowmont-Glen Catchment Initiative, Sediment Dynamic and Flood Risk Management Plan*. Callender: MNV Consulting Ltd.
- Molle, F. (2006). *Planning and Managing Water Resources at the River Basin Level: Emergence and Evolution of a Concept*. IWMI Comprehensive Assessment Research Report 16. Colombo, Sri Lanka: International Water Management Institute.
- Molle, F. (2008). Nirvana concepts, narratives and policy models: insights from the water sector. *Water Alternatives*, 1(1), 131-156.
- Molle, F., Mollinga, P. P., & Meinzen-Dick, R. (2008). Water, politics and development: introducing Water Alternatives. *Water Alternatives*, 1(1), 1-6.
- Mollenkamp, S., Lamers, M., & Ebenhoh, E. (2007). Institutional elements for adaptive water management regimes: comparing two regional water management regimes in the Rhine Basin. In C. Pahl-Wostl, P. Kabat, & J. Moltgen (Eds.), *Adaptive and Integrated Water Management: Coping with Complexity and Uncertainty*. Berlin, Germany: Springer.
- Mollinga, P. P., Meinzen-Dick, R. S., & Merrey, D. J. (2007). Politics, plurality and problemshed: a strategic approach for reform of agricultural water resources management. *Development Policy Review*, 25(6), 699-719.
- Morris, C. (2006). Negotiating the boundary between state-led and farmer approaches to knowing nature: an analysis of UK agri-environment Schemes. *Geoforum*, 37, 113-127.
- Moss, T. (2004). The governance of land use in river basins: prospects for overcoming problems of institutional interplay with the EU WFD. *Land Use Policy*, 21, 85-94.

- Moss, T. (2007). Institutional drivers and constraints of floodplain restoration in Europe. *International Journal of River Basin Management*, 5(2), 121-130.
- Mostert, E., & Pahl-Wostl, C. (2010). Social learning: the key to integrated water resources management? *Water International*, 33(3), 293-304.
- Mostert, E., Pahl-Wostl, C., Rees, Y., Searle, B., Tabara, D., & Tippet, J. (2007). Social learning in European river basin management: barriers and fostering mechanisms from 10 river basins. *Ecology and Society*, 12(1): 19.
- Munton, R. (2003). Deliberative democracy and environmental decision-making. In F. Berkhout, M. Leach, & I. Scoones (Eds.), *Negotiating Environmental Change: New Perspectives from Social Sciences* (pp. 137-58). Cheltenham, England: Edward Elgar Publishing Limited.
- Muro, M., & Jeffrey, P. (2008). A critical review of the theory and application of social learning in participatory natural resource management processes. *Journal of Environmental Planning and Management*, 51(3), 325-344.
- MWH, & Jacobs Babbie (2005). *Sustainable Flood Management Pilot Study Final Report*. Edinburgh, Scotland: Scottish Executive.
- Naess, L.O., Bang, G., Eriksen, S., & Vevatne, J. (2005). Institutional adaptation to climate change: flood responses at the municipal level in Norway. *Global Environmental Change*, 15, 125-138.
- Nature Conservation (Scotland) Act 2004. An Act of the Scottish Parliament, 11th June 2004.
- NE (Natural England) (2008). *HLS Target Area Statement NE03: Tweed and Till Target Area*. Northumberland, England: Natural England.
- Neef, A. (2009). Transforming rural water governance: towards deliberative and polycentric models? *Water alternatives*, 2(1), 53-60.
- Nelson, D. R., Adger, W. N., & Brown, K. (2007). Adaptation to environmental change: contributions of a resilient framework. *Annual Review of Environmental Resources*, 32, 395-419.
- NFUS (National Farmers Union Scotland) (2009). Written evidence. In Scottish Parliament (SP), *Stage 1 Report of the Rural Affairs and Environment Committee, Flood Risk Management Bill*. Edinburgh, Scotland: Scottish Parliament.
- NTAG (National Technical Advisory Group) (2003a). *Sustainable Flood Management Briefing Paper*. Edinburgh, Scotland: National Technical Advisory Group.
- NTAG (National Technical Advisory Group) (2003b). *Scottish Environment Link Paper*. Edinburgh, Scotland: National Technical Advisory Group.
- NTAG (National Technical Advisory Group) (2004). *Final Report*. Edinburgh, Scotland: National Technical Advisory Group.
- O'Connell, E., Ewen, J., O'Donnell, G., & Quinn, P. (2007). Is there a link between agricultural land-use management and flooding? *Hydrology and Earth System Sciences*, 11, 96-107.
- O'Toole, L. J. (2004). The theory-practice issue in policy implementation research. *Public Administration*, 82(2), 309-329.

- OECD (Organisation for Economic Co-operation and Development) (2011). *Water Governance in OECD Countries: a Multi-level Approach*. Paris, France: OECD Publishing.
- Official Report (2009). Scottish Parliament, Stage 3 Chambers Proceedings, 22nd January.
- Olsson, P., Folke, C., & Berkes, F. (2004). Adaptive Comanagement for Building Resilience in Social-Ecological Systems. *Environmental Management*, 34(1), 75-90.
- Olsson, P., Gunderson, L. H., Carpenter, S. R., Ryan, P., Lebel, L., Folke, C., & Holling, C. S. (2006). Shooting the rapids: navigating transitions to adaptive governance of social-ecological systems. *Ecology and Society* 11(1): 18.
- Ostrom, E. (1990). *Governing the Commons: the Evolution of Institutions for Collective Action*. Cambridge, England: Cambridge University Press.
- Pahl-Wostl, C. (2007a). The implications of complexity for integrated resources management. *Environmental Modelling and Software*, 22, 561-569
- Pahl-Wostl, C. (2007b). Transitions towards adaptive management of water facing climate and global change. *Water Resource Management*, 21, 49-62.
- Pahl-Wostl, C., Holtz, G., Kastens, B., & Knieper, C. (2010). Analysing complex water governance regimes: the management and transition framework. *Environmental Science and Policy*, 13(7), 570-581.
- Pahl-Wostl, C., Tabara, D., Bouwen, R., Craps, M., Dewulf, A., Mostert, E., Ridder, D., & Taillieu, T. (2008). The importance of social learning and culture for sustainable water management. *Ecological Economics*, 64, 484-495.
- Parker, D. J. (1995). Floodplain development policy in England and Wales. *Applied Geography*, 15(4), 341-363.
- Parrott, A., & Burningham, H. (2008). Opportunities of, and constraints to, the use of intertidal agri-environment schemes for sustainable coastal defence: a case-study of the Blackwater Estuary, southeast England. *Ocean and Coastal Management*, 51, 352-367.
- Parrott, A., Brooks, W., Harmar, Q., & Pygott, K. (2009). Role of rural land use management in flood and coastal risk management. *Journal of Flood Risk Management*, 2, 272-284.
- Parry, M. L., Canziani, O. F., Palutikof, J. P. & Co-authors (2007). Technical Summary. In M. L. Parry, O. F. Canziani, J. P. Palutikof, P. J. van der Linden & C. E. Hanson (Eds.), *Climate Change 2007: Impacts, Adaptation and Vulnerability, Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (pp. 23-78). Cambridge, England: Cambridge University Press.
- Parson, E. A. & Clark, C. (1995). Sustainable development as social learning: theoretical perspectives and practical challenges for the design of a research program. In L. H. Gunderson, C. S. Holling, & S. S. Light (Eds.), *Barriers and Bridges to the Renewal of Ecosystems and Institutions* (pp. 429-460). New York: Columbia University Press.

- Penning-Rowsell, E., Johnson, C., & Tunstall, S. (2006). Signals from pre-crisis discourse: lessons from UK flooding for global environmental policy change. *Global Environmental Change*, 16, 329-339.
- Persson, A. (2004). *Environmental Policy Integration: An Introduction. Policy Integration for Sustainability Background Paper*. Stockholm, Sweden: Stockholm Environment Institute.
- Pierre, J., & Peters, G. (2000). *Governance, Politics and the State*. Basingstoke, England: Macmillan.
- Pike, T. (2008). *Understanding behaviours in a farming context*. DEFRA Agricultural Change and Environment Discussion Paper.
- Pivot, J. M., Josien, E., & Martin, P. (2002). Farms adaptation to changes in flood risk: a management approach. *Journal of Hydrology*, 267, 12-25.
- Posthumus, H., & Morris, J. (2010). Implications of CAP reform for land management and runoff control in England and Wales? *Land Use Policy*, 27(1), 42-50.
- Posthumus, H., Hewett, C. J. M., Morris, J., & Quinn, P. F. (2008). Agricultural land use and flood risk management: engaging with stakeholders in North Yorkshire. *Agricultural Water Management*, 95, 787-798.
- Posthumus, H., Morris, J., Hess, T. M., Neville, D., Phillips, E., & Baylis, A. (2009). Impacts of the summer 2007 floods on agriculture in England. *Journal of Flood Risk Management*, 2(3), 182-189.
- Previte, J., Pini, B., & Haslam-McKenzie, F. (2007). Q Methodology and rural research. *Sociologia Ruralis*, 47(2), 135-147.
- Purseglove, J. (1989). *Taming the Flood: A History and Natural History of Rivers and Wetlands*. Oxford, England: Oxford University Press.
- Raadgever, G. T. (2008). *Does collaboration enhance learning? The case of future flood management in the Rhine basin*. NeWater Deliverable 1.2.7/1.3.7B. Delft: RBA Centre.
- Raadgever, G. T., Mostert, E., & van de Giesen, N. C. (2008). Identification of stakeholder perspectives on future flood risk management in the Rhine basin using Q methodology. *Hydrology and Earth System Sciences*, 12, 1097-1109.
- RAEC (Rural Affairs and Environment Committee) (2008). *2nd Report of the Rural Affairs and Environment Committee on the Inquiry on Flooding and Flood Management*. Edinburgh: Rural Affairs and Environment Committee.
- RAEC (Rural Affairs and Environment Committee) (2009). *Stage 1 Report of the Rural Affairs and Environment Committee: Flood Risk Management Bill*. Edinburgh, Scotland: Scottish Parliament.
- Reed, M. S. (2008). Stakeholder participation for environmental management: A literature review. *Biological Conservation*, 141, 2417-2431.
- Reed, M. S., Evely, A. C., Cundill, G., Fazey, I., Glass, J., Laing, A., Newig, J., Parrish, B., Prell, C., Raymond, C., & Stringer, L. C. (2010). What is social learning? *Ecology and Society*, 15(4):1.

- Renn, O., & Schweizer, P. J. (2009). Inclusive risk governance: concepts and application to environmental policy-making. *Environmental Policy and Governance*, 19, 174-185.
- Ryedale Flood Research Group (RFRG) (2008). *Making Space for People: Involving Local Knowledge in Flood Risk Research and Management in Ryedale, Yorkshire*. Report of the Ryedale Flood Research Group, 28th October, 2008.
- Ritchie, J., & Lewis, J. (Eds.) (2003). *Qualitative Research Practice*. London, England: SAGE.
- Rittel, H. W. J., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy Sciences*, 4, 155-169.
- Robinson, M., Clayton, M. C., & Henderson, W. C. (1990). The extend of agricultural field drainage in Scotland 1983-86. *Scottish Geographical Magazine*, 105(3), 141-147.
- Rosenau, J. (1992). Governance, order and change in world politics. In J. Rosenau, & E.O. Czempiel (Eds.), *Governance without Government* (pp. 1-29). Cambridge, England: Cambridge University Press.
- Ross, A., Nash, H., & Reid, C.T. (2009). The implementation of EU environmental law in Scotland. *Edinburgh Law Review*, 13, 224-251.
- RSPB (Royal Society for the Protection of Birds) (2011). *An Assessment of the Likely Effectiveness of the Scotland Rural Development Programme 2007-2013 in Delivering for the Environment: Summary Report*. Edinburgh, Scotland: Royal Society for the Protection of Birds.
- Rural Development Company (2009). *Mid Term Evaluation of Scotland Rural Development Programme*. Report for the Scottish Government. Forfar, Scotland: Rural Development Company.
- Sabatier, P. A. (1988). An advocacy coalition framework of policy change and the role of policy-oriented learning therein. *Policy Sciences*, 21, 129-168.
- Sabatier, P.A. (Ed.) (2009). *Theories of the Policy Process* (2nd ed.). Boulder, CA: Westview Press.
- SAIFF (Scottish Advisory and Implementation Flood Forum) (2011). *Task 2: Review of the Scotland Rural Development Programme in Delivering Natural Flood Management*. Draft report. Edinburgh, Scotland: Scottish Advisory and Implementation Flood Forum.
- Sanderson, I. (2002). Evaluation, policy learning and evidence-based policy-making. *Public Administration*, 80(1), 1-22.
- SBC (Scottish Borders Council) (2001a). *Environment Strategy*. Melrose, Scotland: Scottish Borders Council.
- SBC (Scottish Borders Council) (2001b). *Local Biodiversity Action Plan*. Melrose, Scotland: Scottish Borders Council.
- SBC (Scottish Borders Council) (2004). *Action Plans for Blanket Bogs, Upland Cleuch and Scrub Woodland, River and Burns, Native woodland, Lowland and Raised Bog, Grassland and Enclosed Farmland, Fens, Marsh, Swamp and Reedbed, and Corniferous*. Melrose, Scotland: Scottish Borders Council.

- SBC (Scottish Borders Council) (2005). *Scottish Borders Woodland Strategy*. Melrose, Scotland: Scottish Borders Council.
- SBC (Scottish Borders Council) (2006). *Borders Wetland Vision*. Melrose, Scotland: Scottish Borders Council.
- SBC (Scottish Borders Council) (2009). *7th Biennial Report on Flood Prevention, 2007-2009*. Melrose, Scotland: Scottish Borders Council.
- Schneider, A., & Ingram, H. (1990). Behavioural assumptions of policy tools. *Journal of Politics*, 52(2), 510-529.
- Schlager, E. (2007). A comparison of frameworks, theories and models of policy processes. In P. A. Sabatier (Ed.), *Theories of the Policy Process* (2nd ed., pp. 293-321). Boulder, CA: Westview Press.
- SCOTS (Society of Chief Officers of Transportation of Scotland) (2008). Written Evidence. In Rural Affairs and Environment Committee (RAEC), *2nd Report of the Rural Affairs and Environment Committee, Inquiry on Flooding and Flood Management, Annex B*. Edinburgh, Scotland: Rural Affairs and Environment Committee.
- Scruse, J. I., & Sheate, W. R. (2005). Re-framing flood control in England and Wales. *Environmental Values*, 14, 113-137.
- SE (Scottish Executive) (2003). *National Flooding Framework: Statement of Commitment*. Edinburgh, Scotland: Scottish Executive.
- SE (Scottish Executive) (2004a). *A Strategy for the Conservation and Enhancement of Biodiversity in Scotland*. Edinburgh, Scotland: Scottish Executive.
- SE (Scottish Executive) (2004b). *Scottish Planning Policy 7: Planning and Flooding*. Edinburgh, Scotland: Scottish Executive.
- SE (Scottish Executive) (2006a). *Cross Compliance, Notes for Guidance*. Edinburgh, Scotland: Scottish Executive.
- SE (Scottish Executive) (2006b). *The Scottish Forestry Strategy*. Scottish Executive, Edinburgh.
- SEL (Scottish Environment Link) (2008). *The Way Forward for Natural Flood Management in Scotland*. Edinburgh: Scottish Environment Link.
- SEL (Scottish Environment Link) (2009). Written evidence. In Rural Affairs and Environment Committee (RAEC), *Stage 1 Report on the Flood Risk Management Bill*. Edinburgh, Scotland: Scottish Parliament.
- SEPA (Scottish Environment Protection Agency) (2005). *River basin planning Strategy for the Scotland River Basin District*. Stirling, Scotland: Scottish Environment Protection Agency.
- SEPA (Scottish Environment Protection Agency) (2007). *The Water Environment (Controlled Activities) (Scotland) Regulations 2005: a Practical Guide*. Stirling, Scotland: Scottish Environment Protection Agency.
- SEPA (Scottish Environment Protection Agency) (2009). *Scotland River Basin Management Plan*. Stirling, Scotland: Scottish Environment Protection Agency.

- SEPA (Scottish Environment Protection Agency) (2010a). *The Flood Risk Management (Scotland) Act -Planning for Floods, Planning for the Future: Delivering a Partnership Approach*. Stirling, Scotland: Scottish Environment Protection Agency.
- SEPA (Scottish Environment Protection Agency) (2010b). *The Flood Risk Management (Scotland) Act -Planning for Floods, Planning for the Future: Consultation Responses*. Stirling, Scotland: Scottish Environment Protection Agency.
- SEPA (Scottish Environment Protection Agency) (2011a). *Allan Water Natural Flood Management Techniques and Scoping Study*. Prepared by Halcrow Group Limited and University of Stirling. Edinburgh, Scotland: Halcrow Group Limited.
- SEPA (Scottish Environment Protection Agency) (2011b). *The National Flood Risk Assessment: December 2011*. Stirling, Scotland: Scottish Environment Protection Agency.
- SEPA & EA (Scottish Environment Protection Agency & Environment Agency) (2009). *Solway Tweed River Basin Management Plan, 2009-2015*. Stirling, Scotland: Scottish Environment Protection Agency.
- SG (Scottish Government) (2007a). *Scottish Budget Spending Review 2007*. Edinburgh, Scotland: Scottish Government.
- SG (Scottish Government) (2007b). *Scottish Rural Development Programme 2007-2013*. Edinburgh, Scotland: Scottish Government.
- SG (Scottish Government) (2008). *The Future of Flood Risk Management in Scotland: a Consultation Document*. Edinburgh, Scotland: Scottish Government.
- SG (Scottish Government) (2009a). *Scotland's Climate Change Adaptation Framework*. Edinburgh, Scotland: Scottish Government.
- SG (Scottish Government) (2009b). *The Scottish Soil Framework*. Edinburgh, Scotland: Scottish Government.
- SG (Scottish Government) (2010a). *Agricultural Census 2010*. Edinburgh, Scotland: Scottish Government.
- SG (Scottish Government) (2010b). *National Planning Framework for Scotland 2*. Edinburgh, Scotland: Scottish Government.
- SG (Scottish Government) (2010c). *Key Environment Statistics*. Edinburgh, Scotland: Scottish Government.
- SG (Scottish Government) (2011a). *The Flood Risk Management (Scotland) Act: Delivering Sustainable Flood Management*. Edinburgh, Scotland: The Scottish Government.
- SG (Scottish Government) (2011b). *Getting the Best from Our Land: a Land Use Strategy for Scotland*. Edinburgh, Scotland: Scottish Government.
- SG (Scottish Government) (2011c). *The Process for Ongoing Approval for all Forestry Proposals –Flowchart from June 2011*. Edinburgh: Scottish Government.
- Shrubsole, D. (2007). From structures to sustainability: a history of flood management strategies in Canada. *International Journal of Emergency Management*, 4(2), 183-196.

- Skelcher, C. (2005). Jurisdictional integrity, polycentricism, and the design of democratic governance. *Governance: an International Journal of Policy, Administration, and Institutions*, 18(1), 89-110.
- Smith, K., & Ward, R. (1998). *Floods Physical Processes and Human Impacts*. Chichester, England: Wiley.
- SNH (Scottish Natural Heritage) (2002). *Natural Heritage Futures on Borders hill and Eastern Lowlands*. Perth, Scotland: Scottish Natural Heritage.
- SNH (Scottish Natural Heritage) (2009a). *Applying an Ecosystem Approach in Scotland: A Framework for Action*. Perth, Scotland: Scottish Natural Heritage.
- SNH (Scottish Natural Heritage) (2009b). *Climate Change and the Natural Heritage: SNH's Approach and Action Plan 2009-2014*. Perth, Scotland: Scottish Natural Heritage.
- SNH (Scottish Natural Heritage) (2009c). *A Handbook for Environmental Impact Assessment: Guidance for Competent Authorities*. Edinburgh, Scotland: Scottish Natural Heritage.
- SNH (Scottish Natural Heritage) (2009d). *Natural Heritage Futures on Forests, Freshwaters, and Hills—Update*. Perth, Scotland: Scottish Natural Heritage.
- SNH (Scottish Natural Heritage) (2009e). *Natural Heritage Futures on Farmlands—Update*. Perth, Scotland: Scottish Natural Heritage.
- SNH (Scottish Natural Heritage) (2009f). *Natural Heritage Futures Borders Hill and Eastern Lowlands —Update*. Perth, Scotland: Scottish Natural Heritage.
- SNP (Scottish National Party) (2007). *Party Manifesto for the Scottish Parliament Elections 2007*. Edinburgh, Scotland: Scottish National Party.
- SO (Scottish Office) (1992). *Grants Improvement and Coast Defence, 14 February 1992*. Edinburgh, Scotland: Scottish Office.
- SO (Scottish Office) (1995). *National Planning Policy Guideline 7: Planning and Flooding*. Edinburgh, Scotland: Scottish Office.
- Soulsby, C., Black, A. R., & Werritty, A. (2002). Hydrological science, society and the sustainable management of Scottish freshwaters resources in the 21st century. *The Science of the Total Environment*, 294, 213-220.
- SPICE (Scottish Parliament Information Centre) (2009). *Flood Risk Management (Scotland) Bill Briefing June 2009*. Edinburgh, Scotland: Scottish Parliament.
- Spray, C., Ball, T., & Rouillard, J. (2010). Bridging the water law, policy, science interface: flood risk management in Scotland. *Water Law*, 20, 165-174.
- Sproule-Jones, M. (2002). Institutional Experiments in the Improvement of the North American Great Lakes Environment. *Canadian Journal of Political Science*, 35(4), 835-857.
- Steelman, T. A., & Maguire, L. A. (1999). Understanding participant perspectives: Q Methodology in national forest management. *Journal of Policy Analysis and Management*, 18(3), 361-388.

- Steyaert P., & Jiggins, J. (2007). Governance of complex environmental situations through social learning: a synthesis of SLIM's lesson for research, policy and practice. *Environmental Science and Policy*, 10, 575-586.
- Sultana, P., Thompson, P., & Green, C. (2008). Can England learn lessons from Bangladesh in introducing participatory floodplain management? *Water Resources Management*, 22, 357-376.
- Sutherland, L.A. (2010). Environmental Grants and Regulations in Strategic Farm Business Decision-Making: A Case-Study of Attitudinal Behaviour in Scotland. *Land Use Policy*, 27, 415-423.
- Sztompka, P. (1993). *The Sociology of Social Change*. Oxford, England: Blackwell.
- Tetzlaff, D., McDonnell, J. J., Uhlenbrook, S., McGuire, K. J., Bogaart, P. W., Naef, F., Baird, P. W., Dunn, S. M., & Soulsby, C. (2008). Conceptualising catchment processes: simply too complex? *Hydrological processes*, 22, 1727-1730.
- TF (Tweed Forum) (2010a). *Tweed Catchment Management Plan 2005-2009*. Melrose, Scotland: Tweed Forum.
- TF (Tweed Forum) (2010b). *Tweed Wetland Strategy*. Melrose, Scotland: Tweed Forum.
- Thorne, C. R., Evans, E. P., & Penning-Roswell, E. C. (2007). *Future Flooding and Coastal Erosion Risks*. London, UK: Thomas Telford Publishing.
- Town and Country Planning (Scotland) Act 1997 (c8). An Act of the Scottish Parliament, 27th February 1997.
- Tunstall, S. M., Johnson, C. L., & Penning-Roswell, E. C. (2004). *Flood Hazard Management in England and Wales: from land drainage to flood risk management*. Paper presented at the World Congress on Natural Disaster Mitigation, 19-21 February 2004, New-Delhi, India.
- Van den Hove, S. (2006). Between consensus and compromise: acknowledging the negotiation dimension in participatory approaches. *Land Use Policy*, 23, 10-17.
- Vreugdendil, H., Slinger, J., Thissen, W., & Ker Rault, P. (2010). Pilot projects in water management. *Ecology and Society*, 15(3): 13.
- Vogler, J., & Jordan, A. (2003). Chapter 5: governance and the environment. In F. Berkhout, M. Leach, & I. Scoones (Eds.), *Negotiating Environmental Change: New perspectives from Social Sciences* (pp. 137-158). Cheltenham, England: Edward Elgar Publishing Limited.
- Vos, F., Rodriguez, J., Below, R., & Guha-Sapir, D. (2010). *Annual Disaster Statistical Review 2009: Numbers and Trends*. Brussels, Belgium: Centre for Research on the Epidemiology of Disasters.
- Walters, C. J., & Holling, C. S. (1990). Large-scale management experiments and learning by doing. *Ecology*, 71(6), 2060-2068.
- Water Resources Act 1991. An Act of the Parliament of the United Kingdom, 27th July 1991.
- Water Environment Water Services (Scotland) Act 2003 (asp 3). An Act of the Scottish Parliament, 29th January 2003.

- Watson, N., Walker, G., & Medd, W. (2007). Critical perspectives on IWM: Editorial. *The Geographical Journal*, 173(4), 297-299.
- WCED (World Commission on Environment and Development) (1987). *Our Common Future*. Oxford, England: Oxford University Press.
- Weather, H., & Evans, E. (2009). Land use, water management and future flood risk. *Land Use Policy*, 26(1), 251-264.
- Webler, T., & Tuler, S. (2006). Four perspectives on public participation process in environmental assessment and decision-making: combined results from 10 case-studies. *Policy Studies Journal*, 34(4), 699-722.
- Webler, T., Danielson, S., & Tuler, S. (2009). *Using Q Method to Reveal Social Perspectives in Environmental Research*. Greenfield, MA: Social and Environmental Research Institute.
- Weiss, T.G. (2000). Governance, good governance and global governance: Conceptual and actual challenges. *Third World Quarterly*, 21(5), 795-814.
- Werritty, A. (2006) Sustainable Flood Management: oxymoron or new paradigm? *Area*, 38(1), 16-23.
- Werritty, A., Houston, D., Ball, T., Tavendale, A., & Black, A. (2006). *Exploring the Social Impacts of Flood Risk and Flooding in Scotland*. Edinburgh, Scotland: Scottish Executive.
- Werritty, A., Black, A., Duck, R., Finlinson, B., Thurston, N., Shackley, S., & Crichton, D. (2002). *Climate Change: Flooding Occurrences Review*. Edinburgh, Scotland: Stationery Office.
- Werritty, C., Ball, T., Spray, C., Bonell, M., Rouillard, J., Archer, N., Bowles, C., & Moir, H. (2010). *Restoration Strategy: Eddleston Scoping Study*. Dundee, Edinburgh: University of Dundee.
- Wharton, G., & Gilvear, D. J. (2006). River restoration in the UK: meeting the dual needs of the European Union Water Framework Directive and flood defence. *International Journal of River Basin Management*, 4(4), 1-12.
- Wightman, A. (2010). *The Poor Had No Lawyers: Who Owns Scotland?* Edinburgh, Scotland: Birlinn Limited.
- Wilby, R. L., Beven, K. J., & Reynard, N. S. (2008). Climate change and fluvial flood risk in the UK: more of the same? *Hydrological Processes*, 22, 2511-2523.
- WMO (World Meteorological Organisation) (2009). *Integrated Flood Management Concept Paper*. Associated Programme on Flood Management in association with Global Water Partnership (WMO-No1047). Geneva, Switzerland: World Meteorological Organisation.
- WWAP (World Water Assessment Programme) (2009). *The United Nations World Water Development Report 3: Water in a Changing World*. Paris, France: UNESCO, and London, England: Earthscan.
- WWF (World-Wide Fund for Nature) (2002). *Turning the Tide on Flooding*. Aberfeldy, Scotland: WWF-Scotland.
- WWF (World-Wide Fund for Nature) (2007). *Flood Planner: a Manual for the Natural Management of River Floods*. Dunkeld, Scotland: WWF-Scotland.

- WWF (World-Wide Fund for Nature) (2008). *Slowing the Flow: a Natural Solution to Flooding*. Dunkeld, Scotland: WWF-Scotland.
- Young, O. R., King, L. A., & Schroeder, H. (Eds.) (2008). *Institutions and Environment Change: Principal Findings, Applications and Research Frontiers*. Cambridge, MA: The MIT Press.

Appendices

APPENDIX A. DOCUMENTS EXAMINED FOR CHAPTER 2

- CoSLA (Convention of Scottish Local Authorities) (2003) *Flood Task Group Final Report*. Edinburgh, Scotland: Convention of Scottish Local Authorities.
- EA (Environment Agency) (1998). *Response to the Independent Report on the Easter 1998 Floods: Action Plan*. Bristol, England: Environment Agency.
- EA (Environment Agency) (2001). *Lessons Learned: the Autumn 2000 Floods*. Bristol, Scotland: Environmental Agency.
- FBAG (Flood Bill Advisory Group) (2007). *Workplans, Membership and Minutes of the Meetings for the Main Committee and the three Sub-Committee*. Edinburgh, Scotland: Flooding Bill Advisory Group.
- FBAG (Flood Bill Advisory Group) (2008). *Response to FBAG comments on the Flooding Bill*. Edinburgh: Flooding Issues Advisory Committee.
- FIAC (Flooding Issues Advisory Committee) (2005a). *The Way Forward*. Edinburgh, Scotland: Flooding Issue Advisory Committee.
- FIAC (Flooding Issues Advisory Committee) (2005b). *What is Sustainable Flood Management*. Edinburgh, Scotland: Flooding Issue Advisory Committee.
- FIAC (Flooding Issues Advisory Committee) (2005c). *Work Plan, Membership and Minutes of the Meetings for the Main and the three Sub-Committee*. Edinburgh, Scotland: Flooding Issues Advisory Committee.
- FIAC (Flooding Issues Advisory Committee) (2006). *Sustainable Flood Management and Rural Land Use*. Edinburgh, Scotland: Flooding Issues and Advisory Committee.
- FIAC (Flooding Issues Advisory Committee) (2007). *Final Report*. Edinburgh, Scotland: Flooding Issues and Advisory Committee.
- Hansard (1957). House of Commons, Scottish Standing Committee, Vol. 4, 3rd, 5th, 17th, 19th December.
- Hansard (1958). House of Commons, Scottish Standing Committee, Vol. 4, 23rd, 28th, 30th January, and 4th, 6th, 11th, 13th, 18th February.
- Hansard (1960a). House of Commons, Scottish Grand Committee, Vol. 5, 17th November.
- Hansard (1960b). House of Commons, Scottish Standing Committee, Vol. 4, 6th, 8th, 13th, 15th, 20th December.
- Hansard (1961a). House of Lords, Vol. 228, 16 February, cols. 886-908.
- Hansard (1961b). House of Lords, Vol. 229, 2nd March, cols. 231-42.
- Hansard (1961c). House of Commons, Vol. 633, 1st February, cols. 1070-1144.
- Hansard (1961d). House of Commons, Volume 643, 1st July, cols. 1342-1402.
- Hansard (1997a). House of Commons, Volume 5, 26th February, cols. 381-396.
- Hansard (1997b). House of Lords, Volume 579, 10th March, cols. 74-81.
- HC (House of Commons) (1950). *Report of the Land Drainage (Scotland) Committee for the Scottish Office Department of Agriculture for Scotland*. House of Common Parliamentary Papers.
- HC (House of Commons) (1960). *1960-1961 Bill 9 Flood Prevention (Scotland) Bill Explanatory Notes*. House of Common Parliamentary Papers.
- HC (House of Commons) (1994a). *1994/95 Bill 19 Natural Disasters (Scotland)*. House of Common Parliamentary Papers.
- HC (House of Commons) (1994b). *1994/95 Bill 108 Flood Prevention and Land Drainage (Scotland)*. House of Common Parliamentary Papers.
- HC (House of Commons) (1996). *1996-1997 Bill 36 Flood Prevention and Land Drainage (Scotland) Bill Explanatory Notes*. House of Common Parliamentary Papers.
- ICE (Institute of Civil Engineering) (2001). *Learning to Live with Rivers*. London, England: Institution of Civil Engineers.
- JBA (2005). *Natural Flood Storage and Extreme Flood Events*. Edinburgh, Scotland: Scottish Executive.

- JBA (2007). *Scottish Flood Defence Asset Database: Final Report*. Edinburgh, Scotland: Scottish Executive.
- Land Drainage (Scotland) Act 1958. An Act of the UK Parliament of the United-Kingdom, 14th May 1958.
- Local Government (Scotland) Act 1994. An Act of the Parliament of the United-Kingdom, 3rd November 1994.
- MWH & Jacobs Babbie (2005). *Sustainable Flood Management Pilot Study Final Report*. Edinburgh, Scotland: Scottish Executive.
- NTAG (National Technical Advisory Group) (2003a). *Sustainable Flood Management Briefing Paper*. Edinburgh, Scotland: National Technical Advisory Group.
- NTAG (National Technical Advisory Group) (2003b). *Scottish Environment Link Paper*. Edinburgh, Scotland: National Technical Advisory Group.
- NTAG (National Technical Advisory Group) (2004a). *Final Report*. Edinburgh, Scotland: National Technical Advisory Group.
- NTAG (National Technical Advisory Group) (2004b). *Sustainable Flood Management: Final Report*. Edinburgh, Scotland: National Technical Advisory Group.
- NTAG (National Technical Advisory Group) (2003c). *Workplans, Membership and Minutes of the Meetings for the Main Committee and the Three Sub-committee*. Edinburgh, Scotland: National Technical Advisory Group.
- Official Report (2009a). *Stage 2 Proceedings of the Rural Affairs and Environment Committee*. Edinburgh, Scotland: Scottish Parliament.
- Official Report (2009b). *Stage 3 Chambers Proceedings*. Edinburgh, Scotland: Scottish Parliament.
- RAEC (Rural Affairs and Environment Committee) (2007a). *Debate, 07th September 2007*. Edinburgh, Scotland: Scottish Parliament.
- RAEC (Rural Affairs and Environment Committee) (2007b). *Debate, 19th September 2007*. Edinburgh, Scotland: Scottish Parliament.
- RAEC (Rural Affairs and Environment Committee) (2007c). *Debate, 20th February 2007*. Edinburgh, Scotland: Scottish Parliament.
- RAEC (Rural Affairs and Environment Committee) (2007d). *Debate, 27th June 2007*. Edinburgh, Scotland: Scottish Parliament.
- RAEC (Rural Affairs and Environment Committee) (2008). *2nd Report of the Rural Affairs and Environment Committee on the Inquiry on Flooding and Flood Management*. Edinburgh: Rural Affairs and Environment Committee.
- RAEC (Rural Affairs and Environment Committee) (2009). *Stage 1 Report of the Rural Affairs and Environment Committee: Flood Risk Management Bill*. Edinburgh, Scotland: Scottish Parliament.
- SE (Scottish Executive) (2003a). *National Flooding Framework: Statement of Commitment*. Edinburgh, Scotland: Scottish Executive.
- SE (Scottish Executive) (2003b). *Review of Flood Prevention Scheme Levels of Protection in Face of Climate Change*. Edinburgh, Scotland: Scottish Executive.
- SE (Scottish Executive) (2005). *Guidance to Local Authorities on Making Flood Prevention Schemes*. Edinburgh, Scotland: Scottish Office.
- SEL (Scottish Environment Link) (2005). *Water Framework Directive and Flooding: Implications for Flooding Policies in Scotland*. Edinburgh, Scotland: Scottish Environment Link.
- SEL (Scottish Environment Link) (2007). *Briefing Paper on Sustainable Flood Management*. Edinburgh, Scotland: Scottish Environment Link.
- SEL (Scottish Environment Link) (2008). *The Way Forward for Natural Flood Management in Scotland*. Edinburgh, Scotland: Scottish Environment Link.
- SG (Scottish Government) (2007). *Scottish Budget Spending Review 2007*. Edinburgh, Scotland: Scottish Government.
- SG (Scottish Government) (2008a). *Flood Risk Management (Scotland) Bill Delegated Power Memorandum*. Edinburgh, Scotland: Scottish Parliament.

- SG (Scottish Government) (2008b). *Flood Risk Management (Scotland) Bill Policy Memorandum*. Edinburgh, Scotland: Scottish Parliament.
- SG (Scottish Government) (2008c). *Flooding Bill Financial Implications Assessment*. Edinburgh, Scotland: Scottish Parliament.
- SG (Scottish Government) (2008d). *The Future of Flood Risk Management in Scotland: A Consultation Document*. Edinburgh, Scotland: Scottish Government.
- SG (Scottish Government) (2008e). *The Future of Flood Risk Management in Scotland: Report of the Evidence for the Consultation Document*. Edinburgh, Scotland: Scottish Government.
- SG (Scottish Government) (2009). Response of the Scottish Government to the Stage 1 Rural Affairs and the Environment Committee Report. Edinburgh, Scotland: Scottish Parliament.
- SG (Scottish Government) (2011). *Scottish Local Government Financial Statistics 2009-2010*. Edinburgh, Scotland: Scottish Government.
- SNIFFER (Scotland and Northern Ireland Forum For Environmental Research) (2008). *Coastal Flooding in Scotland, a Scoping Study*. Edinburgh, Scotland: Scotland and Northern Ireland Forum For Environmental Research.
- SNP (Scottish National Party) (2007). *Party Manifesto for the Scottish Parliament Elections 2007*. Edinburgh, Scotland: Scottish National Party.
- SO (Scottish Office) (1992). *Grants Improvement and Coast Defence, 14 February 1992*. Edinburgh, Scotland: Scottish Office.
- SP (Scottish Parliament) (2002). *SP Bill 57 Water Environment Water Services (Scotland) Bill Explanatory Notes*. Edinburgh, Scotland: Scottish Parliament.
- SPICE (Scottish Parliament Information Centre) (2009). *Flood Risk Management (Scotland) Bill Briefing June 2009*. Edinburgh, Scotland: Scottish Parliament.
- Werritty, A. (2005). *Review of the Local Authorities Biennial Flood Reports*. Edinburgh, Scotland: Scottish Executive.
- Werritty, A., Houston, D., Ball, T., Tavendale, A., & Black, A. (2006). *Exploring the Social Impacts of Flood Risk and Flooding in Scotland*. Edinburgh, Scotland: Scottish Executive.
- Werritty, A., Black, A., Duck, R., Finlinson, B., Thurston, N., Shackley, S., & Crichton, D. (2002). *Climate Change: Flooding Occurrences Review*. Edinburgh, Scotland: Scottish Executive.
- WWF (World-Wide Fund for Nature) (2002). *Turning the Tide on Flooding*. Aberfeldy, Scotland: WWF-Scotland.
- WWF (World-Wide Fund for Nature) (2007). *Flood Planner, a Manual for the Natural Management of River Floods*. Dunkeld, Scotland: WWF-Scotland.
- WWF (World-Wide Fund for Nature) (2008). *Slowing the Flow, a Natural Solution to Flooding*. Dunkeld, Scotland: WWF-Scotland.

APPENDIX B. DETAILS OF INTERVIEWS FOR CHAPTER 2 AND CHAPTER 3

Organisation interviewed	Date	Code
Scottish Government	02/06/2009	Scottish Government 1
Scottish Government	21/04/2010	Scottish Government 2
Scottish Government	11/10/2010	Scottish Government 3
Scottish Government	12/10/2010	Scottish Government 4
Scottish Environment Protection Agency	24/04/2009	SEPA 1
Scottish Environment Protection Agency	22/06/2009	SEPA 2
Scottish Environment Protection Agency	12/04/2010	SEPA 3
Scottish Natural Heritage	11/10/2010	SNH 1
Convention of Scottish Local Authorities	05/10/2010	CoSLA
Royal Society for the Protection of Birds	27/05/2009	RSPB
WWF-Scotland	17/11/2009	WWF-Scotland
National Farmers Union Scotland	08/10/2010	NFUS
Academic	06/07/2009	Academic 1
Academic	30/09/2010	Academic 2
Member of Scottish Parliament	09/09/2010	MSP 1
Member of Scottish Parliament	02/11/2010	MSP 2

APPENDIX C. FLOOD DEFENCE ASSET TYPES

The Scottish Flood Defence Database registers all known flood defence assets in Flood Prevention Schemes promoted under the Flood Prevention (Scotland) Act 1961. The database now includes flood defence assets of Flood Protection Schemes promoted under the Flood Risk Management (Scotland) Act 2009. JBA Consulting is currently managing the database. The database is geo-referenced and includes details of the defence, type, condition, standard of protection provided by flood defences, flood inundation area, defended areas, number of properties defended, value of benefits, and historic flood information (Bassett *et al.*, 2007). The database represents the most exhaustive attempt to register all flood defence assets in Scotland. The database manager was contacted in June 2011 to obtain data on year of scheme confirmation (e.g. issue of legal order) and year of completion, asset types and description, and location description.

Figure B.1 presents flood defence asset types registered for which the year of completion is known. Assets in the 2010s include completed assets in 2010 and 2011, as well as those not yet completed. Asset types are divided into storage, culvert, embankment, channel improvements and food wall. In total, 22 storage areas have been built: two in the 1980s, eight in the 1990s and 12 in the 2000s. They include dry pond (e.g. playing fields), washlands, and wet ponds (e.g. loch).

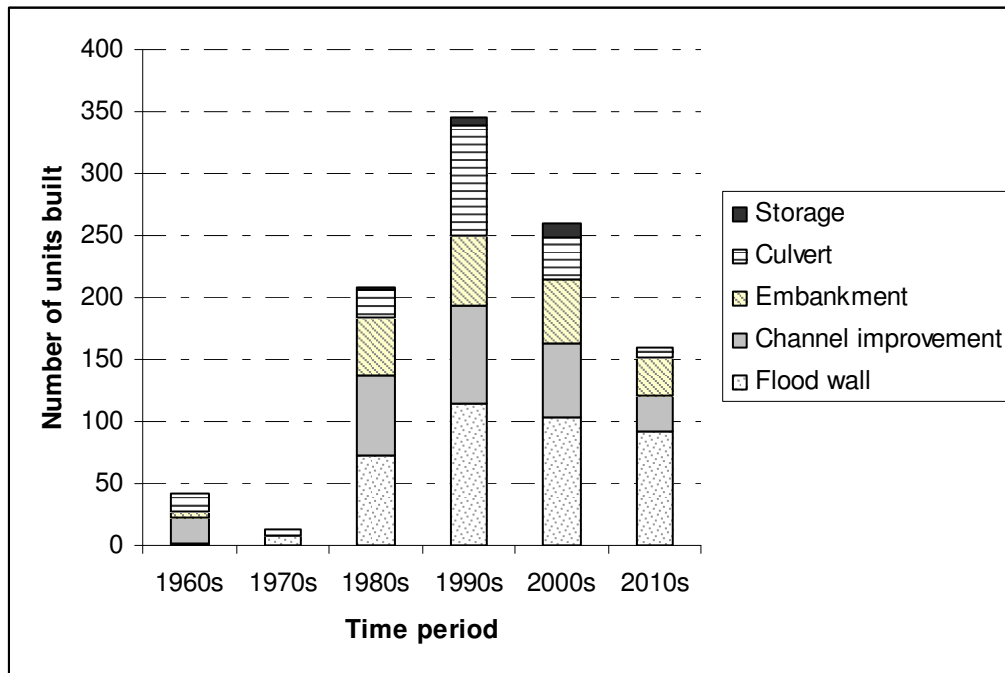


Figure B.1 - Flood asset types built per time period.

References

Bassett, D., Pettit, A., Anderton, C., & Grace, P. (2007). *Scottish National Inventory of Flood Defences*. JBA Consulting, Edinburgh, Scotland: Scottish Executive.

APPENDIX D. DOCUMENTS EXAMINED FOR CHAPTER 3

- Cook, P. (2009). *Scotland Rural Development Programme: First Stage Review*. Scotland: Cook & Partners.
- CoSLA (Convention of Scottish Local Authorities) (2003) *Flood Task Group Final Report*. Edinburgh, Scotland: Convention of Scottish Local Authorities.
- Council Regulation (EC) No 1698/2005 of 20th September 2005 on support for rural development by the European Agricultural Fund for Rural Development. *Official Journal of the European Union*, L 277, 1-40.
- Council Regulation (EC) No 73/2009 of 19th January 2009 establishing common rules for direct support schemes for farmers under the common agricultural policy and establishing certain support schemes for farmers. *Official Journal of the European Union*, L 30, 16-99.
- DEFRA (Department for Environment, Food and Rural Affairs) (2007). *Conserving Biodiversity: the UK Approach*. London, England: Department for Environment, Food and Rural Affairs.
- FC (Forestry Commission) (2007). *Tree Felling: Getting Permission*. Edinburgh, Scotland: Forestry Commission.
- FC (Forestry Commission) (2009a). *Climate Change Action Plan 2009-2011*. Edinburgh, Scotland: Forestry Commission.
- FC (Forestry Commission) (2009b). *Undertaking an Environmental Impact Assessment in Forestry and Preparing an Environmental Statement*. Edinburgh, Scotland: Forestry Commission.
- FC (Forestry Commission) (2010a). *The Scottish Forestry Strategy Implementation Plan 2010-2013 and 2009-2010 Progress Report*. Edinburgh, Scotland: Forestry Commission.
- FC (Forestry Commission) (2010b). *Planning for Forestry and Woodlands: the Right Tree in the Right Place*. Edinburgh, Scotland: Forestry Commission.
- FC (Forestry Commission) (2011a). *The UK Forestry Standard: the Government's Approach to Sustainable Forestry*. Edinburgh, Scotland: Forestry Commission.
- FC (Forestry Commission) (2011b). *Forest and Biodiversity: UK Forestry Standard Guidelines*. Edinburgh: Forestry Commission.
- FC (Forestry Commission) (2011c). *Forest and Climate Change: UK Forestry Standard Guidelines*. Edinburgh, Scotland: Forestry Commission.
- FC (Forestry Commission) (2011d). *Forest and Historic Environment: UK Forestry Standard Guidelines*. Edinburgh, Scotland: Forestry Commission.
- FC (Forestry Commission) (2011e). *Forest and People: UK Forestry Standard Guidelines*. Edinburgh, Scotland: Forestry Commission.
- FC (Forestry Commission) (2011f). *Forest and Soils: UK Forestry Standard Guidelines*. Edinburgh, Scotland: Forestry Commission.
- FC (Forestry Commission) (2011g). *Forest and Water: UK Forestry Standard Guidelines*. Edinburgh, Scotland: Forestry Commission.
- Marsden, K. (2011). *SPICe Briefing: CAP Reform - Legislative proposals*. Edinburgh, Scotland: Scottish Parliament.
- RSPB (Royal Society for the Protection of Birds) (2011). *An Assessment of the Likely Effectiveness of the Scotland Rural Development Programme 2007-2013 in Delivering for the Environment: Summary Report*. Edinburgh, Scotland: Royal Society for the Protection of Birds.
- RAEC (Rural Affairs and Environment Committee) (2008). *2nd Report of the Rural Affairs and Environment Committee, Inquiry on Flooding and Flood Management*. Edinburgh, Scotland: Scottish Parliament.
- Rural Development Company (2010). *Mid-Term Evaluation of Scotland Rural Development Programme, Report for the Scottish Government*. Forfar, Scotland: Rural Development Company Limited.

- Scottish Biodiversity Forum (2005). *Implementation Plans for a Strategy for the Conservation and Enhancement of Biodiversity in Scotland*. Edinburgh, Scotland: Scottish Biodiversity Forum.
- SE (Scottish Executive) (2000). *Countryside Premium Scheme*. Edinburgh, Scotland: Scottish Executive.
- SE (Scottish Executive) (2003). *A guide to the Implementation of the Water Environment Water Services (Scotland) Act 2003*. Edinburgh, Scotland: Scottish Executive.
- SE (Scottish Executive) (2004a). *A Strategy for the Conservation and Enhancement of Biodiversity in Scotland*. Edinburgh, Scotland: Scottish Executive.
- SE (Scottish Executive) (2004b). *Rural Stewardship Scheme*. Edinburgh, Scotland: Scottish Executive.
- SE (Scottish Executive) (2004c). *Scottish Planning Policy: Planning and Flooding*. Edinburgh, Scotland: Scottish Executive.
- SE (Scottish Executive) (2005). *Water Environment (Controlled Activities) (Scotland) Regulations Policy Statement*. Edinburgh, Scotland: Scottish Executive.
- SE (Scottish Executive) (2006a). *Cross Compliance, Notes for Guidance*. Edinburgh, Scotland: Scottish Executive.
- SE (Scottish Executive) (2006b). *Implementing the Water Environment (Controlled Activities) (Scotland) Regulations, Designation of Responsible Authorities*. Edinburgh, Scotland: Scottish Executive.
- SE (Scottish Executive) (2006c). *The Scottish Forestry Strategy*. Edinburgh, Scotland: Scottish Executive.
- SEL (Scottish Environment Link) (2008). *The Way Forward for Natural Flood Management in Scotland*. Edinburgh, Scotland: Scottish Environment Link.
- SEPA (Scottish Environment Protection Agency) (2005). *River Basin Management Planning Strategy*. Edinburgh, Scotland: Scottish Environment Link.
- SEPA (Scottish Environment Protection Agency) (2006). *Significant Water Management Issues in Scotland River Basin District*. Stirling, Scotland: Scottish Environment Protection Agency.
- SEPA (Scottish Environment Protection Agency) (2007). *The Water Environment (Controlled Activities) (Scotland) Regulations 2005: a Practical Guide*. Stirling, Scotland: Scottish Environment Protection Agency.
- SEPA (Scottish Environment Protection Agency) (2009). *Scotland River Basin Management Plan*. Stirling, Scotland: Scottish Environment Protection Agency.
- SEPA (Scottish Environment Protection Agency) (2010a). *The Flood Risk Management (Scotland) Act -Planning for Floods, Planning for the Future: Delivering a Partnership Approach*. Stirling, Scotland: Scottish Environment Protection Agency.
- SEPA (Scottish Environment Protection Agency) (2010b). *The Flood Risk Management (Scotland) Act -Planning for Floods, Planning for the Future: Consultation Responses*. Stirling, Scotland: Scottish Environment Protection Agency.
- SEPA (Scottish Environment Protection Agency) (2011a). *Allan Water natural flood management techniques and scoping study*. Prepared by Halcrow Group Limited and University of Stirling. Edinburgh, Scotland: Halcrow Group Limited.
- SEPA (Scottish Environment Protection Agency) (2011b). *The National Flood Risk Assessment: December 2011*. Stirling, Scotland: Scottish Environment Protection Agency.
- SG (Scottish Government) (2007a). *Scottish Budget Spending Review 2007*. Edinburgh, Scotland: Scottish Government.
- SG (Scottish Government) (2007b). *Scottish Rural Development Programme 2007-2013*. Edinburgh, Scotland: Scottish Government.
- SG (Scottish Government) (2008a). *Implementing the Water Environment Water Services (Scotland) Act 2003: Promoting an Integrated Approach: Policy Statement*. Edinburgh, Scotland: Scottish Government.

- SG (Scottish Government) (2008b). *Rural Development Contracts for Land Managers Options: Notes for Guidance*. Edinburgh, Scotland: Scottish Government.
- SG (Scottish Government) (2008c). *The Future of Flood Risk Management in Scotland, a Consultation Document*. Edinburgh, Scotland: Scottish Government.
- SG (Scottish Government) (2009a). *Scotland's Climate Change Adaptation Framework*. Edinburgh, Scotland: Scottish Government.
- SG (Scottish Government) (2009b). *The Scottish Soil Framework*. Edinburgh, Scotland: Scottish Government.
- SG (Scottish Government) (2009c). *Water Framework Directive Guidance Note on River Basin Management Planning*. Edinburgh, Scotland: Scottish Government.
- SG (Scottish Government) (2009d). *Implementing the Water Environment and Water Services (Scotland) Act 2003: Scotland's Water Future Directions, a Consultation*. Edinburgh, Scotland: Scottish Government.
- SG (Scottish Government) (2009e). *Implementing the Water Environment and Water Services (Scotland) Act 2003: Annual Report to the Scottish Parliament 2008*. Edinburgh, Scotland: Scottish Government.
- SG (Scottish Government) (2010a). *Implementation of the Flood Risk Management (Scotland) Act 2009: Annual Report to the Scottish Parliament 2009*. Edinburgh, Scotland: Scottish Government.
- SG (Scottish Government) (2010b). *Implementation of the Water Environment Water Services (Scotland) Act 2003: Annual Report to the Scottish Parliament 2009*. Edinburgh, Scotland: Scottish Government.
- SG (Scottish Government) (2010c). *National Planning Framework for Scotland 2*. Edinburgh, Scotland: Scottish Government.
- SG (Scottish Government) (2010d). *Scotland's Spending Plans and Draft Budget 2011-2013*. Edinburgh, Scotland: Scottish Government.
- SG (Scottish Government) (2011a). *Implementation of Water Environment Water Services (Scotland) Act 2003 and Flood Risk Management (Scotland) Act 2009: Annual Report to Scottish Parliament 2010*. Edinburgh, Scotland: Scottish Government.
- SG (Scottish Government) (2011b). *Scottish Local Government Financial Statistics 2009-2010: National Statistics Publication for Scotland*. Edinburgh, Scotland: Scottish Government.
- SG (Scottish Government) (2011c). *The Flood Risk Management (Scotland) Act: Delivering Sustainable Flood Management*. Edinburgh, Scotland: Scottish Government.
- SG (Scottish Government) (2011d). *The Flood Risk Management (Scotland) Act: Delivering Sustainable Flood Management: a policy Statement*. Edinburgh, Scotland: Scottish Government.
- SG (Scottish Government) (2011e). *Getting the Best from Our Land: A Land Use Strategy for Scotland*. Edinburgh, Scotland: Scottish Government.
- SNH (Scottish Natural Heritage) (2001). *Natural Heritage Futures on Farmland, Forests, Freshwaters, and Hills*. Perth, Scotland: Scottish Natural Heritage.
- SNH (Scottish Natural Heritage) (2003). *Local Biodiversity Action Plan Partnerships*. Perth, Scotland: Scottish Natural Heritage.
- SNH (Scottish Natural Heritage) (2009a). *Natural Heritage Futures on Farmland, Forests, Freshwaters, and Hills—Update*. Perth, Scotland: Scottish Natural Heritage.
- SNH (Scottish Natural Heritage) (2009b). *Climate Change and the Natural Heritage: SNH's Approach and Action Plan 2009-2014*. Perth, Scotland: Scottish Natural Heritage.
- SNH (Scottish Natural Heritage) (2009c). *Applying an Ecosystem Approach in Scotland: A Framework for Action*. Perth, Scotland: Scottish Natural Heritage.
- SNH (Scottish Natural Heritage) (2009d). *A Handbook for Environmental Impact Assessment: Guidance for Competent Authorities*. Edinburgh, Scotland: Scottish Natural Heritage.
- SP (Scottish Parliament) (2009). *Flood Risk Management (Scotland) Act 2009: Explanatory Notes*. Edinburgh, Scotland: Scottish Parliament.

APPENDIX E. PHOTOGRAPHS OF EDDLESTON AND BOWMONT-GLEN CATCHMENTS

The Eddleston catchment

Source: J. J. Rouillard



1



2



3



4



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6

Legend

- 1: Southern view of upper-catchment
- 2: Northern view of middle-catchment
- 3: Northern view of Eddleston village
- 4: Southern view from Eddleston village
- 5: Northern view of the railway embankment in middle-catchment
- 6: Southern view of Peebles

The Bowmont-Glen catchment

Source: J. J. Rouillard, except 6 (MNV Consulting).



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Source: MNV Consulting

Legend

- 1: Southern view of upper catchment
- 2: Northern view of upper catchment
- 3: Northern view of flood defence works in the middle catchment
- 4: Northern view of middle catchment
- 5: Southern view of mid-lower catchment
- 6: Land managers workshop, 03/03/2010

APPENDIX F. MEETINGS ATTENDED AT NATIONAL AND LOCAL LEVEL

Table D.1 - National level meetings attended during the research process (2008-2011)

Dates	Meeting, workshop or conference
23 rd October 2008	Seminar on Implementation of WFD in Scotland
24 th -25 th February 2009	SNIFFER Flood Risk Conference 2009
3 rd March 2009	SNIFFER Natural Flood Management Steering Group Meeting
17 th March 09	Flood Risk Mitigation Seminar
22 nd April 09	The Lee Catchment Flood Risk management Plan seminar
15-16 th October 2009	EU workshop on the implementation of the EU Floods Directive
10-11 th February 2010	SNIFFER Flood Risk Conference 2010
10 th March 2010	Land Use Strategy Stakeholder meeting
31 st March 2010	SEPA-SAC Biennial Conference Climate, Water and Soil: Science, Policy and Practice
8 th September 2010	Consultation event on implementation of Flood Risk Management (Scotland) Act 2009
08-09 th February 2011	SNIFFER Flood Risk Conference 2011

Table D.2 - Local case-studies meeting attended during the research process (2008-2011)

Meeting (case-study and date)	Length	Number of people (other than consultants and researcher)	Attended by researcher
Bowmont 17/09/2009		40	
Bowmont 05/10/2009		17	
Eddleston 21/12/2009	2h	15	
Bowmont 03/03/2010	3h	16	X
Bowmont 01/04/2010	2h	13	X
Bowmont 18/05/2010	2h	13	X
Bowmont 18/05/2010	2h	6	X
Bowmont 18/05/2010	2h	6	X
Bowmont 19/05/2010	2h	5	X
Bowmont 19/05/2010	2h	6	X
Bowmont 14/12/2010	2h	11	X
Eddleston 19/04/2011	2h	10	X

APPENDIX G. DOCUMENTS EXAMINED FOR CHAPTER 4

- DEFRA (Department for Environment, Food and Rural Affairs) (2005). *Making Space for Water: Taking forward a new government strategy for flood and coastal erosion risk management in England*. London, England: Department for Environment, Food and Rural Affairs.
- DEFRA (Department for Environment, Food and Rural Affairs) (2007). *The Rural Development Programme for England 2007-2013: a summary*. London, England: Department for Environment, Food and Rural Affairs.
- EA (Environment Agency) (2009). *Till and Breamish Catchment Flood Management Plan, Summary Report*. Leeds, England: Environment Agency.
- EA (Environment Agency) (2010). *Understanding the Risks, Empowering Communities, Building Resilience: the National Flood and Coastal Erosion Risk Management Strategy for England*. Leeds, England: Environment Agency.
- FC (Forestry Commission) (2009). *Dumfries and Borders Forest District Strategic Plan 2009-2013*. Edinburgh, Scotland: Forestry Commission.
- MNV, & Tweed Forum (2010). *Bowmont-Glen Catchment Initiative, Sediment Dynamic and Flood Risk Management Plan*. Callender: MNV Consulting Ltd.
- NE (Natural England) (2008). *HLS Target Area Statement NE03: Tweed and Till Target Area*. England: Natural England.
- SBC (Scottish Borders Council) (2001a). *Environment Strategy*. Melrose, Scotland: Scottish Borders Council.
- SBC (Scottish Borders Council) (2001b). *Local Biodiversity Action Plan*. Melrose, Scotland: Scottish Borders Council.
- SBC (Scottish Borders Council) (2004). *Action Plans for Blanket bogs, Upland Ccleuch and Scrub Woodland, River and Burns, Native woodland, Lowland and raised bog, Grassland and Enclosed Farmland, Fens, Marsh, Swamp and Reedbed, & Corniferous*. Melrose, Scotland: Scottish Borders Council.
- SBC (Scottish Borders Council) (2005). *Scottish Borders Woodland Strategy*. Melrose, Scotland: Scottish Borders Council.
- SBC (Scottish Borders Council) (2006). *Borders Wetland Vision*. Melrose, Scotland: Scottish Borders Council.
- SBC (Scottish Borders Council) (2007). *6th Biennial Report on Flood Prevention: November 2006-October 2007*. Melrose, Scotland: Scottish Borders Council.
- SBC (Scottish Borders Council) (2008). *Altered Structure Plan 2001-2018*. Melrose, Scotland: Scottish Borders Council.
- SBC (Scottish Borders Council) (2009). *7th Biennial Report on Flood Prevention: November 2007-October 2009*. Melrose, Scotland: Scottish Borders Council.
- SEPA & EA (Scottish Environment Protection Agency & Environment Agency) (2007). *Solway Tweed River Basin Significant Water Management Issues*. Stirling: Scottish Environment Protection Agency.
- SEPA & EA (Scottish Environment Protection Agency & Environment Agency) (2009). *Solway Tweed River Basin Management Plan, 2009-2015*. Stirling: Scottish Environment Protection Agency.
- SNH (Scottish Natural Heritage) (2002). *Natural Heritage Futures on Borders hill and Eastern lowlands*. Edinburgh, Scotland: Scottish Natural Heritage.
- SNH (Scottish Natural Heritage) (2009). *Natural Heritage Futures Borders Hill and Eastern lowlands –Update*. Perth, Scotland: Scottish Natural Heritage.
- TF (Tweed Forum) (2010a). *Tweed Catchment Management Plan 2005-2009*. Melrose, Scotland: Tweed Forum.
- TF (Tweed Forum) (2010b). *Tweed Wetland Strategy*. Melrose, Scotland: Tweed Forum.

APPENDIX H. DETAILS OF INTERVIEWS FOR CHAPTER 4 AND CHAPTER 5

Agency/land manager	Eddleston (E)/ Bowmont (B)	Scotland (S)/ England (E)	Interviewed November 2009	Interviewed May 2010	Interviewed March 2011	Code Interviews	Q-Sort	Code Q sorts*
Tweed Forum	E and B	S and E	X		X	TF 1	X	X
Tweed Forum	E and B	S	X		X	TF 2	X	X
Tweed Forum	B	E		X	X	TF 3	X	X
Tweed Foundation	E and B	S and E	X		X	TFS	X	X
Scottish Borders Council	E and B	S	X		X	SBC 1	X	X
Scottish Borders Council	E and B	S			X	SBC 2		
Scottish Borders Council	E and B	S			X	SBC 3		
Scottish Environment Protection Agency	E	S	X			SEPA 4		
Scottish Environment Protection Agency	B	S			X	SEPA 5	X	X
Scottish Natural Heritage	B	S			X	SNH 2	X	X
Scottish Natural Heritage	E	S			X	SNH 3		
Environment Agency	B	E	X		X	EA	X	X
Natural England	B	E			X	NE	X	X
Landowner	B	S		X	X	Land manager 1	X	LM5
Landowner	B	E		X	X	Land manager 2	X	LM9
Landowner	E	S			X	Land manager 3		
Landowner	E	S	X			Land manager 4		
Landowner	E	S			X	Land manager 5		
Landowner	E	S			X	Land manager 6		
Landowner	E	S	X			Land manager 7		
Landowner	E	S	X			Land manager 8		
Landowner	E	S	X			Land manager 9		
Landowner and	E	S	X			Land manager 10		

Agency/land manager	Eddleston (E) / Bowmont (B)	Scotland (S) / England (E)	Interviewed November 2009	Interviewed May 2010	Interviewed March 2011	Code Interviews	Q-Sort	Code Q sorts*
Landowner	E	S			X	Land manager 11		
Landowner	E	S			X	Land manager 12		
Landowner	E	S			X	Land manager 13		
Landowner	B	S		X	X	Land manager 14	X	LM15
Landowner	B	S		X	X	Land manager 15	X	LM4
Landowner	B	S			X	Land manager 16	X	LM8
Landowner	B	E		X	X	Land manager 17	X	LM16
Landowner	B	E		X	X	Land manager 18	X	LM17
Landowner	B	E			X	Land manager 19	X	LM2
Landowner and tenant	B	E		X		Land manager 20		
Landowner and tenant	B	S		X	X	Land manager 21	X	LM7
Tenant	B	S		X	X	Land manager 22	X	LM11
Tenant	B	S		X	X	Land manager 23	X	LM1
Tenant	B	S		X	X	Land manager 24	X	LM10
Tenant	B	S		X	X	Land manager 25	X	LM12
Tenant	B	S		X	X	Land manager 26	X	LM13
Tenant	B	S		X	X	Land manager 27	X	LM3
Tenant	B	S		X	X	Land manager 28	X	LM14
Landowner and tenant	B	E		X		Land manager 29		
Landowner and tenant	B	E		X	X	Land manager 30	X	LM6

* Only for land managers in order to keep anonymous results for organisations

APPENDIX I. LIST OF PUBLICATIONS ARISING FROM THE RESEARCH

Journal Papers

- Spray, C., Ball, T., & Rouillard, J. (2010). Bridging the water law, policy, science interface: flood risk management in Scotland. *Journal of Water Law*, 20, 165-174.
- Rouillard, J. J., Heal, K. V., Reeves, A. D., & Ball, T. (2012). The impact of institutions on flood policy learning. *Water Policy*, 14, 232-249.

Conference papers

- Rouillard, J. J., Heal, K. V., Ball, T., & Reeves, A. D. (2010a). *Scottish flood policy in transition: a socio-political analysis*. Paper presented at the International Society for Ecological Economics (ISEE) 11th Biennial Conference Advancing Sustainability in a Time of Crisis, 22-25 August 2010, Bremen, Germany.
- Rouillard J. J., Reeves, A. D., Ball, T., & Heal, K. V. (2010b). *Stakeholder analysis of a river restoration scheme in Scotland*. Paper presented at the SAC and SEPA Biennial Conference Climate, Water and Soil: Science, Policy and Practice (pp. 346-351), 31 March-1 April 2010, Edinburgh, Scotland.
- Werritty, A., Spray, C., Ball, T., Bonell, M., Rouillard, J., MacDonald, A., Comins L., & Richardson, R. (2010). *Integrated catchment management: from rhetoric to reality in a Scottish HELP Basin*. Paper presented the BHS Third International Symposium, 23rd July 2010, Newcastle, UK.

Reports

- Rouillard, J.J. (2009). *Flood risk and land use governance: policy change in Scotland*. Paper presented the Earth System Governance Winter School: The Challenge of Adaptive Governance, 23rd Nov.-1st Dec. 2009, Amsterdam, The Netherlands.
- Rouillard, J. J. (2010a). *Incentives to Land managers for Flood Management*. Briefing note for the Scottish Government.
- Rouillard, J. J. (2010b). Living in the Bowmont-Glen catchment. In MNV, & Tweed Forum, *Bowmont-Glen Catchment Initiative, Sediment Dynamic and Flood Risk Management Plan*. Callender, Scotland: MNV Consulting Ltd.
- Werritty, C., Ball, T., Spray, C., Bonell, M., Rouillard, J., Archer, N., Bowles, C., & Moir, H. (2010). *Restoration Strategy: Eddleston Scoping Study*. Dundee, Scotland: University of Dundee.